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# **AEROSPACE MEDICINE AND BIOLOGY**

**A CONTINUING BIBLIOGRAPHY**

**WITH INDEXES**

**(Supplement 156)**

**JULY 1976**

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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 156)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in JUNE 1976 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA)*



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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 170 reports, articles and other documents announced during June 1976 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964, since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes—subject and personal author—are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1976 Supplements.

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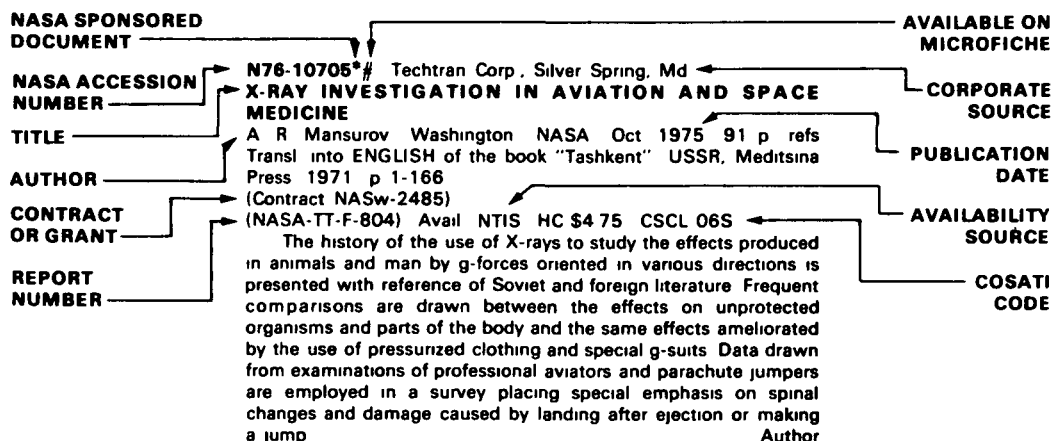
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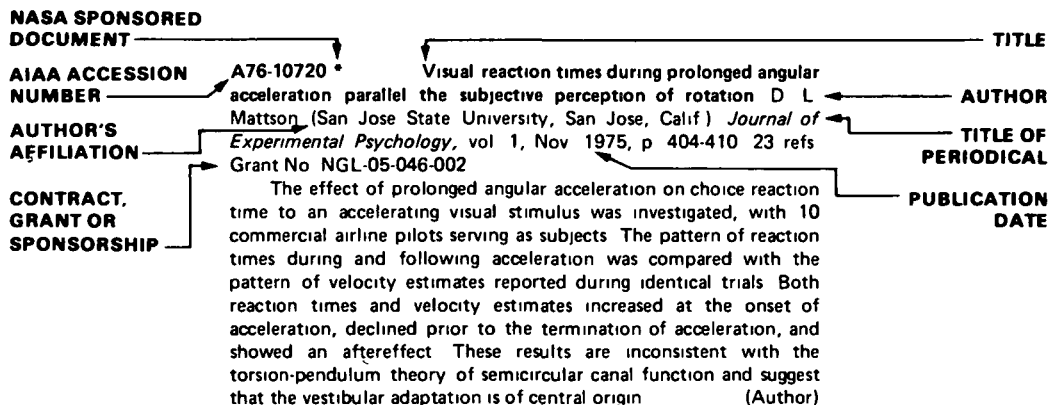
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## TYPICAL CITATION AND ABSTRACT FROM IAA



# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography ( Suppl. 156)*

JULY 1976

## IAA ENTRIES

**A76-25913** Health effects of sulfur dioxide and sulfuric acid aerosols K A Bustueva (Central Institute for Advanced Medical Training, Moscow, USSR) In International Conference on Environmental Sensing and Assessment, Las Vegas, Nev., September 14-19, 1975, Proceedings Volume 1 New York, Institute of Electrical and Electronics Engineers, Inc., 1976, p 1 121 to 3 12-1 20 refs

Previous experimental investigations into the effects of SO<sub>2</sub> and H<sub>2</sub>SO<sub>4</sub> aerosols on the health of laboratory animals and industrial workers are reviewed. These investigations have demonstrated that (1) SO<sub>2</sub> has a general resorptive action characterized by its effects on enzymes and metabolic processes, (2) the chronic action of SO<sub>2</sub> sharply decreases the formation of agglutinins in test animals, and (3) SO<sub>2</sub> circulating in the blood can cause intensive irritation of the interoceptors, resulting in a reflexory impairment of enzymes and a sharp depression of immunobiological activity. The potential carcinogenic action of SO<sub>2</sub> is stressed, and the irritating effects of H<sub>2</sub>SO<sub>4</sub> aerosol on the respiratory system are noted. F G M

**A76-25997** Effects of chronic, continuous exposure to simulated urban air pollution on laboratory animals with cardiovascular and respiratory diseases P M Hartroft, C C Kuhn, III, S V Freeman, C Tansuwan, R O Gregory, and R A Gardner (Washington University, St Louis, Mo.) In International Conference on Environmental Sensing and Assessment, Las Vegas, Nev., September 14 19, 1975, Proceedings Volume 2 New York, Institute of Electrical and Electronics Engineers, Inc., 1976, p 1 34-5 to 5 34 5 12 refs Grant No. NIH-ES-00734

Rodents with cardiovascular and respiratory diseases have been exposed to a mixture of the major gaseous pollutants and fine particulate aerosol (ammonium sulfate) at typical urban ambient and supra-ambient levels for up to 18 months in three large environmental chambers. Comparable experimental animals have been housed in a fourth chamber containing clean filtered air. Results have shown that mortality is directly related to the level of air pollution in hypertensive rats and in rats fed a thrombogenic diet, but not in rats with iron-deficiency anemia, in hamsters with elastase-induced emphysema nor in normal control animals. Other parameters have indicated that air pollution causes more severe disease in those animals who have not yet developed fatal complications. These observations demonstrate that diseased animals exposed to the synergistic effects of a mixture of gaseous and fine particulate pollutants are a sensitive indicator for studying health effects of urban air pollution under controlled conditions. (Author)

**A76-25998** Pulmonary versus nasal deposition of water soluble fine particulate J J Godleski and J P Bercz (Pennsylvania, Medical College, Philadelphia, Pa.) In International Conference on Environmental Sensing and Assessment, Las Vegas, Nev., September 14 19, 1975, Proceedings Volume 2 New York, Institute of Electrical and Electronics Engineers, Inc., 1976, p 1

34-6 to 4 34-6 5 refs U.S. Environmental Protection Agency Grant No. R-802839

Rabbits were exposed 5 minutes to S-35 labeled ammonium sulfate aerosols in which 99% of the particles were smaller than 2.1 microns. The S-35 content was subsequently quantitated in the nose, blood, lungs, urine, and stomach. The sum of the mean deposition in both nose and lung with particle size distributions of 0.5 microns and 0.3 microns mass median diameter was 0.97 and 1.05 micrograms, respectively. Significant differences between the nasal and pulmonary deposition at different particle sizes was noted. Gastric deposition was always 10% of the respiratory deposition. No difference was found between the two particle sizes in 24 hr clearance. These results suggest that some soluble and hygroscopic particles should be studied in the lower ranges of the fine particulate mode to determine possible deleterious pulmonary health effects. C K D

**A76-26095** Nature of a choline receptor and the structure of its active center (Priroda kholinoretseptora i struktura ego aktivnogo tsentra) Edited by B N Veprintsev and E A Vul'fius (Akademiya Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Pushchino, Nauchnyi Tsentr Biologicheskikh Issledovaniy AN SSSR, 1975 194 p In Russian

Review articles and original theoretical and experimental studies are presented dealing with the structure of the choline receptor, its stimulation and desensitization mechanism under the action of cholinomimetic substances, and the mechanisms for the change of permeability of the choline receptor membrane. Topics studied include the biochemical characteristics of the choline receptor, methods of chemical modification for studying choline receptors, correlations between physiological activity of the molecules of cholinomimetic substances and their electronic structure, and the effect of the lifetime of the acetylcholine-choline receptor complex on the equilibrium potential of the plate membrane. P T H

**A76-26096 #** Biochemical characteristics of choline receptor (Biokhimicheskaya kharakteristika kholinoretseptora) V A Kovalenko (Akademiya Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) In Nature of a choline receptor and the structure of its active center Pushchino, Nauchnyi Tsentr Biologicheskikh Issledovaniy AN SSSR, 1975, p 6-21 In Russian

The paper reviews the current status of the problem of identifying the choline receptor, discussing the results of a large number of studies up to the year 1972. Among the available methods for identifying the choline receptor, including the use of reversible binding of choline receptor activators or inhibitors, use of the irreversible binding of their analogs forming covalent bonds, or use of the irreversible binding of protein neurotoxins, it is the latter method which has proved most fruitful. Despite this, however, the problem of identifying the choline receptor is not solved. Fractionation and purification of membrane proteins is a very difficult technological problem. The exact molecular weight of the choline receptor is not known. The existence of a special regulator segment in the choline receptor molecule is still hypothetical. P T H

**A76-26097 #** Investigation of choline receptor by the method of chemical modification (Izucheniye kholinoretseptora s pomoshch'yu metoda khimicheskoi modifikatsii) E A Vul'fius

(Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) In Nature of a choline receptor and the structure of its active center Pushchino, Nauchnyi Tsentr Biologicheskikh Issledovani AN SSSR, 1975, p 22-44 In Russian

The principle, merits, and drawbacks of the method of chemical modification of proteins are described. Methods for increasing the specificity of the method with regard to the macromolecule under investigation, and criteria for identifying the modified amino acid radical are discussed. Some feasible aspects of the use of irreversibly acting reagents for studying receptor proteins are examined. Data are discussed which have been obtained by various investigators using the method of chemical modification, which characterize elements of the structure of the active center of the choline receptor P T H

**A76-26098 #** Study of correlations between the physiological activity of the molecules of cholinomimetic substances and their electronic structure (Izuchenie korrelatsii mezhdu fiziologicheskoi aktivnost'iu molekul kholinomimetikov i ikh elektronnykh stroeniiem) I B Golovanov, V M Sobolev, V N Bushuev, and V N Gagloev (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) In Nature of a choline receptor and the structure of its active center Pushchino, Nauchnyi Tsentr Biologicheskikh Issledovani AN SSSR, 1975, p 52-64 In Russian

**A76-26099 #** Kinetics of the interaction of substances with choline receptors (Kinetika vzaimodeistviia veshchestv s kholinoretseptorami) E V Zermal' (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) In Nature of a choline receptor and the structure of its active center

Pushchino, Nauchnyi Tsentr Biologicheskikh Issledovani AN SSSR, 1975, p 81-105 In Russian

Up to now, the kinetics of the interaction of substances with choline receptors has been studied only indirectly: information on the concentration change of the substance-choline receptor complex is obtained from studying the changes in the degree of pharmacological response. Interpretation of results is rendered difficult by the fact that there is apparently no linear dependence between the concentration and the drug response. The degree of the response depends also on the efficiency, or internal activity, of the given substance. Attempts have been made to determine separately the efficiency and affinity constants of choline receptors, based on the use of alkylating agents. Usually, the steady kinetics of cholinergic substances are studied. Paton's work is an exception: he has successfully achieved separate determination of the rate constants for the direct and reverse reactions of cholinergics and choline receptors P T H

**A76-26100 #** Effect of the lifetime of the acetylcholine-choline receptor complex on the equilibrium potential of end plate membrane (O vliiani vremeni zhizni kompleksa atsetilkholin-kholinoretseptor na potentsial ravnovesiia membrany kontsevoi plastinki) P D Brezhnevskii (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) In Nature of a choline receptor and the structure of its active center Pushchino, Nauchnyi Tsentr Biologicheskikh Issledovani AN SSSR, 1975, p 140-148 In Russian

**A76-26231 #** Modeling of certain thermophysical processes in the human body (Modelirovaniia deiakikh teplofizicheskikh protsessiv u tili liudini) F O Krivoshei (Akademiia Nauk Ukrain'skoi RSR, Institut Teplofiziki, Kiev, Ukrainian SSR) *Akademiia Nauk Ukrain'skoi RSR, Dopovidi, Seriya B - Geologiya, Geofizika, Khimiia ta Biologiya*, Jan 1976, p 55-58 In Ukrainian

The paper formulates a mathematical model for the thermal behavior of muscle tissue undergoing short-duration contraction. The aim of this biothermal model is to study temperature fields in the tissue-skin system, metabolic heat generation and heat losses due to perspiration. The temperature field is assumed to be one-dimensional and the muscle tissue and the skin are assumed to be isotropic with constant thermophysical properties (thermal conductivity, specific heat). The boundary value problem for the thermophysics of muscular contraction is formulated with the aid of a heat conduction equation for the muscle tissue layer B J

**A76-26310 #** Microwave photoconductivity of the native eye retina in rabbits (Mikrovolnovaia fotoprovodimost' nativnoi setchatki glaza krolikov) G B Abdullaev, N M Magomedov, E Iu Iusifov, Sh V Mamedov, and A I Dzhaferov (Akademiia Nauk Azerbaidzhanskoi SSR, Institut Fiziki i Fiziologii, Baku, Azerbaidzhanskoi SSR) *Akademiia Nauk Azerbaidzhanskoi SSR, Doklady*, vol 31, no 9, 1975, p 11-16 16 refs In Russian

Experiments were conducted to study the photoconductivity of pigmented epithelium and retina without it in the native eye of albino and gray chinchilla rabbits by carrying out the measurements at high frequencies such as 10 GHz. The effect of sodium selenite (1 mg per kg body weight) and monoiodoacetic acid (20 mg per kg body weight), administered subcutaneously and intravenously, on the eye sensitivity is evaluated. The animal subjects were decapitated two hours after introduction of the compounds. Results indicate that the microwave photoconductivity of the retina and pigmented epithelium is due to the formation of free and weakly coupled charges which are responsible for the microwave photoconductivity signal in ordinary photoconductors. Photoionization of substance molecules is considered as the main contributor to the observed effect, i.e., photoactivity in these specimens is of a photophysical nature S D

**A76-26311 #** On the procedure of noninvasive evaluation of blood flow rate (K metodike beskrovnogo opredeleniia skorosti krovotoka) I T Abasov, I M Iof, and R I Abasov (Azerbaidzhanskii Nauchno-Issledovatel'skii Institut Rentgenologii, Radiologii i Onkologii, Baku, Azerbaidzhanskoi SSR) *Akademiia Nauk Azerbaidzhanskoi SSR, Doklady*, vol 31, no 9, 1975, p 55-57 6 refs In Russian

A modified version of the oximeter O-57 M is proposed for a more accurate evaluation of the blood flow rate in human subjects from recorded oxymograms. For this purpose, a conventional strip chart recorder provided with an amplification unit to increase the time scale is used. The magnitude of blood flow rate determined by this technique in healthy subjects is found to be  $4.1 \pm 0.51$  sec S D

**A76-26410** The spatial-temporal characteristics of vision when an observer is solving a search problem V I Kushpil', L F Petrova, and V P Smirnov (*Optiko-Mekhanicheskaya Promyshlennost'*, vol 42, Sept 1975, p 4-6) *Soviet Journal of Optical Technology*, vol 42, Sept 1975, p 498-500 6 refs Translation

A method is proposed for determining the probability of finding an object as a function of the size of the operational field of view of an observer who is solving the problem of visually searching for an object. The method is based on recording the path along which the eye moves and on the concept that seeing is possible only when the eyeball is not moving. A description and the results of an experiment are presented (Author)

**A76-26659 #** Microorganisms as producers of hydrogen (Mikroorganizmy-produitsenty vodoroda) E N Kondrat'eva (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) and I N Gogotov (Akademiia Nauk SSSR, Institut Fotosinteza, Pushchino-on-Oka, USSR) *Akademiia Nauk SSSR, Izvestia, Seriya Biologicheskaya*, Jan-Feb 1976, p 69-86 124 refs In Russian

The present paper is a review of published data on microorganisms capable of releasing molecular hydrogen, the condition and ways of its formation, the significance of this process, and the possibility of practical applications. Emphasis is placed on the release of hydrogen by chemotrophs such as obligate and facultative anaerobes, and by several species of phototrophs. Most data confirm that photoproduction of hydrogen by green algae is the result of decomposition of endogenic organic substances. The possibility of hydrogen formation is determined by the presence of a specific enzyme called hydrogenase S D

**A76-26666** The ECG of constrictive pericarditis - Pattern resembling right ventricular hypertrophy E Chesler (Wentworth Hospital, Durban, Republic of South Africa), A S Mitha, and R E Matisonn (Wentworth Hospital, Natal, University, Durban, Republic of South Africa) *American Heart Journal*, vol 91, Apr 1976, p 420-424 12 refs Research supported by the Medical Research Council of the Republic of South Africa

The ECG changes in 122 cases (88 male, 34 female, average age 33 yr) of constrictive pericarditis were examined in order to differentiate constrictive pericarditis from right ventricular hypertrophy and other related heart conditions. The results obtained indicate that 95% of tracings are typical and display a normal QRS axis, low voltage, and generalized T wave flattening or inversion. The remaining 5% of tracings show evidence of right ventricular hypertrophy and half of these exhibit also right axis deviation. The findings are very helpful in the distinction from congestive cardiomyopathy, which may mimic constrictive pericarditis in the subacute stage S D

**A76-26667** The effect of vitamin E on platelet aggregation J A C Gomes, D Venkatachalapathy (US Veterans Administration Hospital, Bronx, Mount Sinai School of Medicine, New York, N Y), and J I Haft (St Michaels Medical Center, Newark, N J) *American Heart Journal*, vol 91, Apr 1976, p 425-429 25 refs

Platelet aggregation studies were carried out in five men with coronary artery disease and angina pectoris and five men with nonspecific chest pain before and after receiving 1000 IU of alpha-tocopherol acetate (vitamin E) orally per day for 8 days. No significant difference was observed in the platelet aggregation response to three concentrations of ADP and two concentrations of epinephrine between the pre- and post-vitamin E periods among the ten subjects. It is suggested that if vitamin E exerts any beneficial effect in the prevention or treatment of thromboembolic phenomena, coronary artery disease, or the initiation of atherogenesis, it does not do so through inhibition of platelet aggregation S D

**A76-26668** The localization of coronary artery stenoses by 12 lead ECG response to graded exercise test - Support for intercoronary steal D Robertson, W J Kostuk, and S P Ahuja (University Hospital, London, Ontario, Canada) *American Heart Journal*, vol 91, Apr 1976, p 437-444 16 refs

The ECG response to graded treadmill exercise tests in patients suspected of having ischemic heart disease was studied using a 12 lead ECG semiautomatic recording system. Sets of simultaneous leads were I, II, III, a V(L), a V(R), a V(F), V1 to V3, and V4 to V6. Exercise continued until the patient's pulse rate reached 90% of the predicted maximal heart rate, fatigue, chest pain, or dyspnea necessitated discontinuing the test, or ischemic ST changes or frequent PVCs occurred. Positive responses were those in which downsloping or horizontal ST segment depression greater than 1 mm and lasting longer than 0.08 sec, or ischemic-type ST-segment elevation occurred. It is shown that with the use of a 12 lead ECG system and with five separate ECG recordings taken after exercise the ischemic ST changes in many cases are concordant with the location and severity of coronary artery stenoses S D

**A76-26684** Intracellular ion concentration and electrical activity in potassium-depleted mammalian soleus muscle fibers N Akaike (Kumamoto University, Kumamoto, Japan) *Pflugers Archiv*, vol 362, no 1, 1976, p 15-20 21 refs

**A76-26685** Potassium induced potential changes in rat diaphragm muscle A Den Hertog (Groningen, Rijksuniversiteit, Groningen, Netherlands) and J J A Mooij *Pflugers Archiv*, vol 362, no 1, 1976, p 69-79 37 refs

**A76-26686** Work-induced potassium changes in skeletal muscle and effluent venous blood assessed by liquid ion-exchanger microelectrodes P Hnik, M Holas, I Krekule, N Kriz, E Ujec, F Vyskocil (Ceskoslovenska Akademie Ved, Fyziologicky Ustav,

Prague, Czechoslovakia), J Mejsnar (Karlova Universita, Prague, Czechoslovakia), and V Smiesko (Slovak Academy of Science, Institute of Normal and Pathological Physiology, Bratislava, Czechoslovakia) *Pflugers Archiv*, vol 362, no 1, 1976, p 85-94 48 refs

**A76-26690** Primary production of oxygen from irradiated water as an explanation for decreased radiobiological oxygen enhancement at high LET K F Baverstock (Medical Research Council, Radiobiology Unit, Harwell, Oxon, England) and W G Burns (Atomic Energy Research Establishment, Radiation and Surface Chemistry Group, Harwell, Oxon, England) *Nature*, vol 260, Mar 25, 1976, p 316-318 18 refs

The paper reports results of sensitive measurements of oxygen yield in water irradiated with radiation of high linear energy transfer (LET) in conditions which precluded oxygen formation in secondary reactions. The oxygen yields are sufficient to account for the decrease in the value of the oxygen enhancement ratio (which is the ratio of the sensitivity to radiation damage of biological cells in the presence of oxygen to the sensitivity under anoxic conditions) found for biological cells irradiated by radiation of high LET compared with the value for low LET radiation B J

**A76-26750 \*** Detectability of auditory signals presented without defined observation intervals C S Watson (Central Institute for the Deaf, Washington University, St Louis, Mo) and T L Nichols (US Army, Food Sciences Laboratory, Natick, Mass) *Acoustical Society of America, Journal*, vol 59, Mar 1976, p 655-668 11 refs Navy-NASA-supported research, Grant No NIH-NS-03856

Ability to detect tones in noise was measured without defined observation intervals. Latency density functions were estimated for the first response following a signal and, separately, for the first response following randomly distributed instances of background noise. Detection performance was measured by the maximum separation between the cumulative latency density functions for signal-plus-noise and for noise alone. Values of the index of detectability, estimated by this procedure, were approximately those obtained with a 2-dB weaker signal and defined observation intervals. Simulation of defined- and non-defined interval tasks with an energy detector showed that this device performs very similarly to the human listener in both cases (Author)

**A76-26769** Quantitative studies in retinex theory - A comparison between theoretical predictions and observer responses to the 'Color Mondrian' experiments J J McCann, S P McKee, and T H Taylor (Polaroid Vision Research Laboratory, Cambridge, Mass) *Vision Research*, vol 16, no 5, 1976, p 445-458 46 refs

Land's Color Mondrian experiments showed that a single wavelength radiance distribution falling on a point on the retina can generate nearly any color sensation. In Part I we repeated that experiment, quantifying the color sensations for each of the many Mondrian areas. In Part II we show that each area's color sensation correlates with a triplet of reflectances measured with photodetectors having the same spectral sensitivities as the cone pigments in the eye. This result provides a description of what the visual system does, but it does not provide a mechanism for how the visual system can do it because the reflectance measurements required the use of a reflectance standard and unchanging illumination. In Part II we describe a model for color sensations that computes three reflectances from the wavelength radiance distribution without reflectance or illumination standards; hence, it is able to predict the color sensations seen by the observer (Author)

**A76-26770** Plasticity of orientation specific chromatic aftereffects H H Mikaelian (New Brunswick, University, Fredericton, Canada) *Vision Research*, vol 16, no 5, 1976, p 459-462 18 refs

Shifts in the orientation of chromatic aftereffects (McCollough effect) were measured in human subjects with and without exposure to visual prismatic tilt. The findings indicate that the phenomenal, or perceived, orientation of the chromatic inducing stimulus, in contrast

to the orientation of its retinal image, is the more accurate predictor of the orientation of the McCollough effect. Thus, while neural feature analyzers may be involved in the mediation of visual orientation, their selective chromatic adaptation cannot be the sole mechanism underlying the generation of contingent aftereffects.

P T H

**A76-26771** **Effect of chromatic contrast on stimulus brightness** L Kerr (Pennsylvania State University, University Park, Pa.) *Vision Research*, vol 16, no 5, 1976, p 463-468. 13 refs. Grant No. NIH EY-01110-01.

The effect of annuli of different wavelengths on the brightness of a chromatic stimulus was assessed by two different methods of measuring brightness, flicker photometry and direct brightness matching to an achromatic stimulus. With flicker photometry, annulus wavelength did not differentially affect stimulus brightness for different test wavelengths, but with direct brightness matches, annulus wavelengths that were the same as or similar to test stimulus wavelengths tended to affect the perceived brightness differently from annulus wavelengths that were dissimilar. These results suggest that, even when highly chromatic stimuli are used, lateral interactions that occur within the chromatic mechanisms do not affect the response in the achromatic mechanism. They also show that the evaluation of lateral interactions with chromatic stimuli depends on the response criterion used to assess those lateral effects. (Author)

**A76-26772** **Binocular interaction in the dark** W Makous, D Teller, and R Boothe (Washington, University, Seattle, Wash.) *Vision Research*, vol 16, no 5, 1976, p 473-476. 23 refs. Grants No. NIH-EY-00421, No. NIH EY 00788.

Replication of the Lansing-Baker phenomenon confirmed that light adaptation of one eye in a particular way can subsequently lower thresholds during dark adaptation of the other eye. Pressure-blinding the non-test eye when dark adapted lowered thresholds in the test eye by the same amount, but pressure-blinding the non-test eye when light adapted had no noticeable effect on the test eye. It follows that a dark adapted eye sends signals to the brain that interfere with detection of signals elicited from the test eye by weak stimuli. The evidence favours interpretation in terms of binocular rivalry rather than ordinary discrimination of signal from noise.

(Author)

**A76-26773** **The effects of spatial frequency adaptation on human evoked potentials** L Mecacci and D Spinelli (CNR, Laboratorio di Neurofisiologia, Pisa, Italy) *Vision Research*, vol 16, no 5, 1976, p 477-479. 7 refs.

The spatial frequency selectivity of the adaptation to gratings in man has been verified with the technique of evoked potentials. The amplitude of the potentials evoked by a low contrast grating is reduced after the adaptation to a high contrast grating of the same spatial frequency and orientation. The effect is maximum for the adapting frequency and extends to other frequencies enclosed within about two octaves. Differences have been found between evoked potentials and contrast threshold as regards the width of the channel affected and the recovery after the adaptation.

(Author)

**A76-26774** **The effect of micromovements of the eye and exposure duration on contrast sensitivity** U Tulunay Keesey and R M Jones (Wisconsin, University, Madison, Wis.) *Vision Research*, vol 16, no 5, 1976, p 481-488. 40 refs. Grant No. NIH EY 00308.

Spatial contrast sensitivity was measured with the normally moving and the stabilized retinal image of sine wave gratings for exposure durations ranging from 6 msec to 4 sec. Sensitivity increased rapidly for both the stabilized and the non-stabilized image of any frequency as a function of duration up to 50 msec. The rate of increase gradually approached zero as the target exposure was lengthened. The shape of the contrast sensitivity curves was primarily determined by exposure duration. Image stabilization resulted in a decrease of sensitivity to a large range of spatial frequencies only when the target was presented for an indefinite period.

(Author)

**A76-26775** **Some characteristics of the visual masking by moving contours** S Mateev, N Iakimov, and L Mitran (B'lgarska Akademia na Naukite, Institut po Fiziologia, Sofia, Bulgaria) *Vision Research*, vol 16, no 5, 1976, p 489-492. 6 refs.

An effect of visual masking was studied in experiments in which subjects viewed a translucent screen while a background consisting of a vertical black/white grating was moved horizontally across the screen, a dark corridor of constant brightness divided the grating, and a stroboscopic flash stimulus was presented in this corridor at a certain fixation point. It was found that the movement of the background increases the visual threshold at this fixation point not crossed by the moving contours, the maximum threshold increase being 2-3 times. Since the threshold remained high all the time that the grating moved, it is only the motion itself, not the acceleration at the beginning or end of the grating motion, that plays a suppressive role. It was found that if the distance between the stimulus and the grating was greater than 4 degrees, the masking effect did not occur. An essential masking effect seems to be induced only by parts of the grating near the tested locus. The question remains open whether it is the continuous motion of the structure over the retina or the successive changes of the luminance on different receptors that contributes most to the masking effect.

P T H

**A76-26776** **The fusion illusion** L Kaufman and A Arditi (New York University, New York, N.Y.) *Vision Research*, vol 16, no 5, 1976, p 535-543. 30 refs. NSF Grant No. GB-36976.

Four experiments were performed to test for the occurrence of perceived central fusion of vertically disparate stimuli. Two of these employed the method of Signal Detection Theory in order to measure the sensitivity of observers in discriminating disparate from non-disparate cyclofusal stimuli along the horizontal meridian. The other two experiments attempted to compare 'fusion' thresholds with monocular control data. The fusion effect could not be differentiated from the limitations of monocular acuity. It was concluded that fusion is an illusion which may be attributed to the effects of suppression and failures of acuity.

(Author)

**A76-26845 \*** **Comparison of seven performance measures in a time-delayed manipulation task** J W Hill (Stanford Research Institute, Menlo Park, Calif.) *IEEE Transactions on Systems, Man, and Cybernetics*, vol SMC-6, Apr 1976, p 286-295. 7 refs. Contract No. NAS2 7507.

Real-time performance data was collected during a pick-up task carried out with a Rancho master slave manipulator using a mini-computer based data taker. In addition to the usual task time measurements, computer algorithms to integrate the energy consumed and to count and time the number of moves were implemented. In addition to these measures, several derived measures such as the fraction of time moving (MRATIO) and mean time per move (MBAR) were obtained in an off-line analysis. Preliminary results of the time delay experiment indicate that two new measures, MRATIO and MBAR, are almost an order of magnitude more sensitive than task time, the conventional measure, in determining performance changes with transmission delays in the range from 0.0 to 1.0 s.

(Author)

**A76-27093** **Protein, iron, and copper changes in the serum of swimmers before and after altitude training (Protein-, Eisen- und Kupfer-Veränderungen im Serum bei Schwimmern vor und nach Hohenstraining)** G Haralambie, J Keul, and F Theumert (Medizinische Universitätsklinik, Freiburg im Breisgau, West Germany) *European Journal of Applied Physiology*, vol 35, no 1, 1976, p 21-31. 55 refs. In German. Research supported by the Bundesinstitut für Sportwissenschaften und Deutsche Forschungsgemeinschaft.

Fifteen male swimmers of mean age 19.3 plus or minus 2.1 years were subjected to a 120-minute swimming exercise test before and after five weeks of intensive training at an altitude of 2000 meters. After the first swimming test there was noted a significant increase in serum alpha-1-acid glycoprotein, alpha-1-antitrypsin, hemopexin, alpha-2-macroglobulin, ceruloplasmin, transferrin, iron, copper, and alpha-2-HS-glycoprotein. The same test taken after altitude training led to only small changes, especially with regard to the iron.

metabolism parameters. After a discussion of the biochemical factors accounting for these changes, it is concluded that the higher altitude conditions provided a greater training stimulus, such that the same test after altitude training did not provide sufficient load to evoke the required reactions for the studied parameters P T H

**A76-27094** Adaptation reactions of workers in ergonomic field studies of information processing work potentials (Anpassungsreaktionen von Arbeitspersonen bei ergonomischen Feldstudien informatorischer Arbeitsinhalte) H Luczak and W Rohmert (Darmstadt, Technische Hochschule, Darmstadt, West Germany) *European Journal of Applied Physiology*, vol 35, no 1, 1976, p 33-47 33 refs In German

Adaptation processes in the performance of information processing tasks were measured in 18 subjects in terms of performance parameters - cycle times, variance of cycle times, informational content of time and errors - and in terms of physiological strain parameters - electromyograms of musculus extensor digitorum and musculus rhomboideus, horizontal and vertical electrooculogram, heart rate and heart rate variability - and are described according to type and frequency. Simultaneous and successive reactions of all measured quantities over the course of the work shift and three successive days are described. They are classified as being due to either training or emotional habituation and are discussed in terms of an experimenter experimental situation model P T H

**A76-27095** Principle of measuring the air-free body volume with the aid of a pressure-difference diving probe (Das Prinzip der Messung des luftfreien Korpervolumens mit Hilfe einer Druckdifferenz-Tauchsonde) P Schmid and W Schlick (Medizinische Universitätsklinik, Vienna, Austria) *European Journal of Applied Physiology*, vol 35, no 1, 1976, p 59-67 12 refs In German. Research supported by the Österreichischer Fond zur Förderung der wissenschaftlichen Forschung OFFWF Project 634, OFFWF Project 1661

A device is described which enables determination of the air- and gas-free body volume along with the lung volume and the amount of intestinal gas. The subject is seated under water on a vertical probe which at its upper end, above the water level, is furnished with measuring rods and adjustable weights for establishing equilibrium as the probe sinks under the subject's weight. Three equilibrium states with different weights provide a physical definition of the air-free body volume, which can be calculated from a series of exactly measurable individual parameters P T H

**A76-27096** Changes of free amino acids in plasma of healthy subjects induced by physical exercise V Brodan, E Kuhn, J. Pechar, and D Tomkova (Institute for Clinical and Experimental Medicine, Prague, Czechoslovakia) *European Journal of Applied Physiology*, vol 35, no 1, 1976, p 69-77 26 refs

Healthy male subjects were subjected to two types of bicycle ergometer loads: (1) 20-min exercise with load of 1.5 W/kg body weight, and (2) graded exercise to point of exhaustion. The sequence of the two trials was alternated at random. In trial 1, only a rise of alanine and drop of leucine were significant. During exhausting exercise, the following changes were significant: rise of alanine and drop of isoleucine, threonine, ornithine, leucine, serine, glycine, and asparagine with glutamine. The alanine increment after intensive exercise is significantly greater than after steady state exercise. Total amino acids did not change significantly, and even exhausting exercise did not lead to a change greater than 3%. Both trials indicate that physical work is associated with a rise of the serum level of ammonia. The rise of alanine while total amino acid level was unaltered supports the existence of a glucose-alanine cycle P T H

**A76-27097** Pulmonary O<sub>2</sub> diffusing capacity at exercise by a modified rebreathing method. A Veicsteinas, H Magnussen, M Meyer (Max-Planck-Institut für experimentelle Medizin, Göttingen, West Germany), and P Cerretelli (Milano, Università, Milan, Italy) *European Journal of Applied Physiology*, vol 35, no 1, 1976, p

79 88 19 refs. Research supported by the Bergbau-Berufsgenossenschaft

The rebreathing technique for measuring pulmonary O<sub>2</sub> diffusing capacity, developed by Cerretelli et al (1973) for the resting condition, was extended to the exercising state, at the same time being simplified to feature only a single rebreathing maneuver. Instead of imposing a steady hypoxic breathing during the whole exercise period, only a priming breath of an O<sub>2</sub> free mixture is administered immediately before the onset of the rebreathing maneuver, thus restricting low O<sub>2</sub> breathing to only 21-15 seconds. To avoid a separate measurement, the mixed venous oxygen tension is calculated by extrapolation of the rebreathing oxygen pressure tracing P T H

**A76-27119** # The differential sensitivity of skin resistance in motor conflicts (Die differentielle Reagibilität des Hautwiderstandes in motorischen Konflikten) H Sorgatz and F Rheinberg (Ruhr Universität, Bochum, West Germany) *Zeitschrift für experimentelle und angewandte Psychologie*, vol 23, no 1, 1976, p 129 139 24 refs In German

An investigation of the differential sensitivity of dorsal skin resistance during a state of increased activation of the motor system is conducted. In the investigation motor conflicts were induced in 56 subjects. It was found that a conflict between two appetent motor reactions has a greater effect on the dorsal skin resistance than on the palmar skin resistance. An aversion conflict appeared to be physiologically less stimulating than the appetent conflict G R

**A76-27598** # The effect of high temperature and moderate hypoxia on the auditory analyzer (O vliyanii na slukhovoii analizator vysokoi temperatury i umerennoi gipoksii) E V Lapaev, V V Aleshin, and G I Tarasenko *Voenno-Meditsinskii Zhurnal*, Jan 1976, p 53, 54 In Russian

The functional condition of the auditory analyzer under the combined influence of high temperature and moderate hypoxia was investigated. Subjects were exposed to temperatures of 35, 40, and 45 deg C and levels of hypoxia corresponding to those at an altitude of 3000 m for 1 hour. The differential frequency threshold remained within normal limits. The auditory threshold at low and middle frequencies tended to increase, with increases as large as 12-14 dB noted in the 125-250 Hz range. These changes had no significant effect on the reception of aural information C K D

**A76-27599** # Change in the reactivity of the vestibular analyzer under conditions of hypoxia (Izmenenie reaktivnosti vestibularnogo analizatora v usloviakh gipoksii) I A Sidel'nikov *Voenno-Meditsinskii Zhurnal*, Jan 1976, p 54-57 7 refs In Russian

The occurrence of the illusion of counter-rotation and nystagmus was investigated in 120 subjects under control conditions and after 30-min exposure to a gas mixture corresponding to an altitude of 5000 m. Under conditions of hypoxia the reactivity of the vestibular analyzer changed at a high level of adequate stimulus (an angular velocity of 180 deg/sec). The duration of the illusion of counter-rotation increased under these conditions, while the nystagmatic reaction decreased in frequency and duration due to change in the blood supply to the brain. Under conditions of hypoxia the position of an aircraft will be sensed by the pilot later and at higher accelerations than under normal flight conditions C K D

**A76-27616** Physical effort and the metabolic and hormonal effects of training (Effort physique et effets métaboliques et hormonaux de l'entraînement) P Pesquies (Centre de Recherche de Médecine Aéronautique, Paris, France), J P Fouillot, J Molinie, and M Vrillac (Ecole Interarmées des Sports, Fontainebleau, Seine-et-Marne, France) *Revue de Médecine Aéronautique et Spatiale*, vol 14, 1st Quarter, 1975, p 8-12 6 refs In French

The levels of various indicators of physical and hormonal changes, including cortisol, somatotrophic hormone, and lactic and pyruvic acid, were measured in the blood of 20 boys between the ages of 16 and 21 before and after a two-month course of physical training at the Ecole Interarmées des Sports. No significant differ-

ences were noted in the levels of cortisol following physical exertion before and after the completion of training. A slight increase in the level of somatotrophic hormone as a function of physical exertion was found both before and after training, however, training significantly reduced the gradient. The levels of both lactic and pyruvic acid were higher after exercise than before, but the increment was markedly smaller after training. It is suggested that the levels of certain such indicator substances might be used to monitor the progress of physical training. C K D

**A76-27617** Audiogram and exposure to infrasonic variations in air pressure (Audiogramme et exposition à des variations infrasonores de la pression aérienne) P Borredon (Centre de Recherches de Médecine Aéronautique, Paris, France) and J Nathie (Centre Principal d'Expertise du Personnel Navigant, Paris, France) *Revue de Médecine Aéronautique et Spatiale*, vol 14, 1st Quarter, 1975, p 13-19. 5 refs. In French

A group of men was exposed to sinusoidal variations in air pressure at a frequency of 7.5 Hz and a level of 130 dB for 50 min. One hour after exposure audiograms were taken to establish the auditory threshold at 250, 500, 1000, 2000, 3000 and 4000 Hz. No significant effects were noted. C K D

**A76-27618** The role of the laboratory in tracking down tropical diseases - Its interest in the surveillance of flight personnel (Rôle du laboratoire dans le dépistage des maladies tropicales - Son intérêt dans la surveillance du personnel navigant) M Payet (Hôpital Claude Bernard, Paris, France) *Revue de Médecine Aéronautique et Spatiale*, vol 14, 1st Quarter, 1975, p 20-22. In French

The role of laboratory analyses in the maintenance of acceptable health standards in flight personnel having contact with tropical regions of Africa, South America, or the West Indies is discussed. The procedures recommended for routine urinalyses and hemotological work-ups to screen patients for the presence of parasites and tropical diseases are outlined. Special attention is given to the reliability of various laboratory techniques for the diagnosis of sleeping sickness and amoebiasis. It is recommended that flight personnel who are exposed to tropical climates undergo the basic hematological examination once every six months to ensure the required health standard. C K D

**A76-27619** The effects of sonic booms on cardio-vascular parameters and the levels of parotid steroids in man (Effets supersoniques des bangs sur les paramètres cardio-vasculaires et sur les niveaux des stéroïdes parotidiens chez l'homme) P Pesquies, J-M Demange, B Vettes, F Galen, D Merino, A Gibert, and P Quandieu (*Congrès International de Médecine Aéronautique et Spatiale*, 22nd, Beirut, Lebanon, Oct 7-11, 1974) *Revue de Médecine Aéronautique et Spatiale*, vol 14, 1st Quarter, 1975, p 23-25. In French

Five subjects were exposed to a series of 7 mbar simulated sonic booms. Before, during, and after the experiment the ECG of the subjects was monitored together with their blood pressure and other cardiac parameters. Saliva samples were taken continuously, and the levels of the 17 hydroxycorticosteroids were determined by radioisotope analysis. No significant effects were noted in either the cardio-vascular parameters or in the levels of parotid steroids, however, a slight increase in blood pressure was detected when the subjects were exposed to a further series of sonic booms at 10 mbar. C K D

**A76-27620** Some comments on the effects of noise on sleep (Quelques remarques sur les effets des bruits sur le sommeil) A Lucas and E Lafontaine (Compagnie Nationale Air France, Paris, France) (*Congrès International de Médecine Aéronautique et Spatiale*, 22nd, Beirut, Lebanon, Oct. 7-11, 1974) *Revue de Médecine Aéronautique et Spatiale*, vol 14, 1st Quarter, 1975, p 26, 27. In French

The auditory threshold was measured in 20 and 45 year old subjects with normal hearing and in 70 year old subjects with slight hearing loss at sleep stages 1 and 2. No significant variations from the

waking auditory threshold were noted. The subjects were awakened in 1 to 3 sec by a 50 dB signal. At 30 to 50 dB subjects were aroused in 37 out of 60 cases, in an additional 14 cases transition from stage 2 to stage 1 sleep was observed. Signals in the region of 30 dB induced transition from stage 2 to stage 1 in 40 out of 60 cases, arousal in 7 cases, and no response in 13 cases. An ambient noise level of 30 dB did not significantly alter the sleep stages, however, the frequency of stage 2-stage 1 transition doubled. A gradual increase in white noise was less likely to cause arousal than a sudden increase, a short term increase was more likely to induce awakening if it was not repeated rhythmically. C K D

**A76-27621** Study of cartilaginous conduction - Its diagnostic interest in investigating perceptive deafness (Etude de la conduction cartilagineuse - Intérêt diagnostique dans l'étude des surdités de perception) E Lafontaine, P Pialoux, and P Fontelle (Compagnie Nationale Air France, Paris, France) (*Congrès International de Médecine Aéronautique et Spatiale*, 22nd, Beirut, Lebanon, Oct 7-11, 1974) *Revue de Médecine Aéronautique et Spatiale*, vol 14, 1st Quarter, 1975, p 28-30. In French

A comparative study was carried out of the auditory thresholds determined by investigating bone conduction through air and cartilage conduction through air. The vibrator was placed on the tragus, completely covering the outer auditory canal. The subjects included persons with perceptive and transmission deafness and persons with normal hearing. It was shown that in cases of perceptive deafness the study of bone conduction through air is effective only when the tympano-ossicular system is normal. In the case of endocochlear impairment recruitment was confirmed by a significant augmentation of cartilage and bone conduction at all frequencies. The possibility of localizing lesions of the inner cochlea and eliminating retrocochlear lesions was demonstrated. C K D

**A76-27622** Multiple fractures of the spinal column after a crash /with respect to a recent case with exceptional radio-clinical aspects/ (Fractures multiples du rachis dorsal après crash /à propos d'un cas récent avec aspects radio-cliniques exceptionnels/) R P Delahaye, H Bocquet, R Auffret, P J Metges, H Gimbergues, and M Chantome (Hôpital Val-de-Grâce, Hôpital Begin, Saint-Mande, Val-de-Marne, Centre d'Essais en Vol, Bretigny-sur-Orge, Essonne, France) *Revue de Médecine Aéronautique et Spatiale*, vol 14, 1st Quarter, 1975, p 31-35. In French

An analysis is presented of a case of multiple complex injuries of the spine sustained as the result of an emergency crash landing. The pilot suffered a lesion showing a right lateral displacement of the D6, D7, and D8 vertebral bodies. The posterior wall remained in place. In spite of the extent of the injuries, no neural lesions were observed, and the pilot recovered after one year of immobilization. In the case of multiple spinal fractures in which the lesions involve only the vertebral body, the most important trauma mechanism is apparently sudden flexion of the spine confined by the restraining safety harness. C K D

**A76-27623** A new pilot head up display - Medical and physiological considerations (Un nouveau viseur de pilotage tête haute - Considérations médico-physiologiques) J Lavernhe (Compagnie Nationale Air France, Paris, France) *Revue de Médecine Aéronautique et Spatiale*, vol 14, 1st Quarter, 1975, p 37-43. In French

A comparison is made between perceptual aspects of a head up display and those associated with traditional IMC guidance. IMC guidance requires the integration and analysis of at least 8 parameters. The instrumental latency introduces a significant delay in perception. In contrast, the proposed head up display includes only three parameters: the velocity vector, the incidence, and the total gradient, represented by vertical displacement reference marks which the pilot must position with respect to one another. Placement of the flight parameters in the central field of vision shortens sensory perception. An overall shortening of the perception-reaction loop may be predicted. C K D



**A76-27624 \*** Automatic recognition and analysis of synapses J A Ungerleider (National Biomedical Research Foundation, Washington, D C), R S Ledley (Georgetown University Medical Center, Washington, D C), and F E Bloom (National Institute of Mental Health, Laboratory of Neuropharmacology, Washington, D C) *Computers in Biology and Medicine*, vol 6, Jan 1976, p 61-66 5 refs Grants No NIH-GM-15192, No NIH-RR-05681, Contract No NAS5-11436

An automatic system for recognizing synaptic junctions would allow analysis of large samples of tissue for the possible classification of specific well-defined sets of synapses based upon structural morphometric indices. In this paper the three steps of our system are described: (1) cytochemical tissue preparation to allow easy recognition of the synaptic junctions, (2) transmitting the tissue information to a computer, and (3) analyzing each field to recognize the synapses and make measurements on them (Author)

**A76-27625** Digital boundary detection, volumetric and wall motion analysis of left ventricular cine angiograms R W Smalling, M H Skolnick, D Myers (Texas, University, Houston, Tex.), R Shabeti (Kentucky, University, Lexington, Ky.), J C Cole (Baylor University, Houston, Tex.), and D Johnston (Texas, University, M D Anderson Hospital, Tumor Institute, Houston, Tex.) *Computers in Biology and Medicine*, vol 6, Jan 1976, p 73-85 7 refs Research supported by the M D Anderson Hospital, University of Texas, and Baylor University

A set of algorithms have been developed to automate the analysis of cine ventriculographic data by digital methods. The visual data in the form of a cine ventriculogram is converted to digital data and stored in packed form on magnetic tape. The analysis procedure then: (1) detects the ventricular boundary, (2) smooths the rough ventricular outline, (3) detects the aortic valve position, and (4) translates and rotates each ventricular outline to a common set of internal axes. The program calculates on a frame by frame basis ventricular volume, projected ventricular area and constructs an instantaneous polar analysis of wall position. It currently takes 27 sec of computer time to digitize and analyze one frame of data.

(Author)

**A76-27773** Correlation between precordial accelerocardiogram and left ventricular pressure. L Hume, A H Kitchin, and S R Reuben (Western General Hospital, Edinburgh, Scotland) *British Heart Journal*, vol 38, Mar 1976, p 233-239 29 refs

A comparative study was conducted for the P wave amplitude of the precordial accelerocardiogram in 6 normal subjects and 21 patients with heart disease without vital valve involvement at rest and after 3 min of isometric handgrip at 30% maximum voluntary contraction. At rest, the patient group exhibited a significant linear correlation between the P wave amplitude, relative to maximum systolic amplitude (P/DE), and the left ventricular end-diastolic pressure. However, comparison of data on P/DE for the two groups disclosed no significant difference. Handgrip tests on the patient group revealed a significant linear correlation between the percentage increase in the P wave amplitude and the percentage increase in the left ventricular end-diastolic pressure. The results obtained suggest that accelerocardiography proves useful in noninvasive monitoring of changes in left ventricular end-diastolic pressure in serial studies or in response to acute interventions S D

**A76-27774 \*** Duration of diastole versus cycle length as correlates of left ventricular ejection time D Weisdorf and D H Spodick (Lemuel Shattuck Hospital, Tufts University, Boston, Mass.) *British Heart Journal*, vol 38, Mar 1976, p 282-284 10 refs NASA-supported research

Studies were done on 82 normal subjects to evaluate cycle length vs duration of diastole as determinants of left ventricular ejection time. Cycle length and its reciprocal, heart rate, had the highest correlation with left ventricular ejection time. Removal of the self-correlation of left ventricular ejection time within cycle length reduces the correlation so that, of all intervals, duration of

diastole had the highest correlation as a determinant of left ventricular ejection time. Cycle length and heart rate remain valuable as spuriously close but not misleading correlates for predicting or correcting left ventricular ejection time (Author)

**A76-27825** The detection of structure in visual displays. C D Frith (London, University, London, England) *Acta Psychologica*, vol 40, Apr 1976, p 115-125 14 refs

The structural complexity of visual displays was investigated by measuring the time observers took to pick out the structured quadrant in a display with three random quadrants. The structured quadrant was composed of a basic subunit which was repeated with the various transformations (reflection, rotation and counterchange) used in the production of symmetry. When the subunit formed 1/4 of the structured display reflection was detected most rapidly, with plain repetition most slowly and rotation intermediate. The addition of counterchange made reflection as difficult to detect as rotation. It is suggested that observers detect structure by searching for corresponding small details. Rotated and reflected details are easily recognized as corresponding, but counterchanged details are not. The type of symmetry rule determines the distance apart of corresponding details, those that are close together being discovered more quickly. Mirror reflection, in particular, has the property of generating displays in which many of the corresponding details are very close together. Thus stimuli which might be thought identical in information content can be markedly different in subjective complexity (Author)

**A76-27909** Ion-osmotic hyperthermia during exercise in dogs J E Greenleaf, S Kolzowski, K Nazar, H Kaciuba-Uscilko, Z Brzezinska, and A Ziemba (Polska Akademia Nauk, Zaklad Fizjologii Doswiadczalnej, Warsaw, Poland) *American Journal of Physiology*, vol 230, Jan 1976, p 74-79 17 refs

The effect of intravenous infusions of NaCl solutions of various osmotic concentrations on temperature regulation was investigated in dogs at rest and during 1 hr of moderate exercise. Infusion of hypertonic solutions resulted in increased levels of sodium ions in the plasma, elevated osmotic concentrations, and higher equilibrium levels of rectal temperature during exercise. Water intake significantly reduced the ion-osmotic hyperthermia. The temperature equilibrium level was not influenced by changes in the plasma volume C K D

**A76-27912 \*** Histamine H2 receptor - Involvement in gastric ulceration P A Brown, J Vernikos-Danellis (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.), and T H Brown (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Stanford University, Stanford, Calif.) *Life Sciences*, vol 18, 1976, p 339-344 30 refs

The involvement of the H1 and H2 receptors for histamine in the pathogenesis of gastric ulcers was investigated in rats. Metiamide, an H2 receptor antagonist, reliably reduced ulceration produced by stress alone or by a combination of stress and aspirin. In contrast, pyrilamine, which blocks only the H1 receptor, was without effect under these same conditions. The results support the hypothesis that histamine mediates both stress and stress plus aspirin induced ulceration by a mechanism involving the H2 receptor (Author)

**A76-27920 #** Effect of low-frequency electrical stimulation of the caudate nucleus on the cortical electrical activity and the wakefulness-sleep cycle (Vliianie nizkочастotnogo elektricheskogo razdrazheniia khvostatogo iadra na elektricheskuiu aktivnost' kory i na tsikl bodrstvovanie-son) T N Oniani and M V Keshelava Gogichadze (Akademiia Nauk Gruzinskoi SSR, Laboratoriia Sravnitel'noi Neurofizologii, Tiflis, Georgian SSR) *Fiziologicheskii Zhurnal SSSR*, vol 62, Jan 1976, p 29-37 35 refs In Russian

**A76-27921 # Distribution of carbon dioxide and oxygen tension values in cerebral cortical neurons and surrounding tissue (Raspreделение velichin napriazhenii uglekislogo gaza i kisloroda v neironakh kory golovnogo mozga i v okruzhaiushchei ikh tkani)** Iu Ia Kisiakov (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimi, Leningrad, USSR) and K P Ivanov (Akademiia Nauk SSSR, Laboratoriia Termoregulatsii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 62, Jan 1976, p 66-72 8 refs In Russian

A three-dimensional mathematical model of a cerebral unit is proposed which consists of four capillaries arranged in parallel with an inscribed sphere at the center which represents a neuron body. The proposed model allows calculation of PCO<sub>2</sub> and PO<sub>2</sub> fields in the neuron and its surrounding tissues. The model is used to evaluate the effect of changes in PCO<sub>2</sub> of the arterial blood on the transport of O<sub>2</sub> and CO<sub>2</sub> from the capillaries to the neuron and surrounding tissue. It is shown that in contrast to PO<sub>2</sub>, PCO<sub>2</sub> exhibits a uniform distribution due to a higher solubility than oxygen. Even with sharp changes (20 Torr) PCO<sub>2</sub> of the arterial blood, the shifts of PO<sub>2</sub> in the tissues is relatively low (about 5 Torr). The results obtained may be used to explain the important role of CO<sub>2</sub> in the regulation of cerebral blood circulation S D

**A76-27922 # Conditions of nonfatigue in skeletal muscles (Ob usloviakh neutomiiaemosti skeletnykh myshts)** V P Zamost'ian (Ministerstvo Zdravookhraneniia Ukrainoi SSR, Institut Meditsinskikh Problem Fizicheskoi Kul'tury, Kiev, Ukrainian SSR) *Fiziologicheskii Zhurnal SSSR*, vol 62, Jan 1976, p 97-103 34 refs In Russian

Work studies in white rats with indirect stimulation of the m triceps surae in situ show that the muscle is capable of working for scores of hours without any signs of fatigue. Such working capacity of the neuromuscular system is possible only if the work loads do not exceed 0.15-0.20 of the maximal tetanic strength and the stimulation frequency is about 40 Hz. Maintaining stimulation within definite ranges of parameters ensures the indefatigability of skeletal muscles in isometric contraction. The constant amplitude of action potentials during the whole period of work and the quick relaxation of the contracting muscle working for a long time are indicative of the intensity of electric and metabolic processes taking place in the muscle S D

**A76-27923 # Heat content of the body as a principal parameter of thermoregulation (O teplosoderzhanii organizma kak osnovnom parametre termoregulatsii)** N A Slepchuk and G V Rumiantsev (Akademiia Nauk SSSR, Laboratoriia Termoregulatsii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 62, Jan 1976, p 121-127 11 refs In Russian

The technique of multiple thermometry and calorimetry is used to evaluate the role of heat content changes of the body in the thermoregulatory vascular response of the auricle floor in the rabbit. Heat content was varied using electric heaters implanted in the abdominal cavity of the animal, the calorimetric temperature being kept at a constant specified level (19-21 C) throughout the experiment. It is shown that the heat content of the body is a major parameter of thermoregulation. The heat threshold varied in the range 81-320 cal/kg, depending on the various initial heat contents in the animal. The heat threshold is always higher for a low initial heat content than for a high initial heat content S D

**A76-27946 # Circadian rhythm of the activity of the system hypothalamus-hypophysis-adrenal cortex (Tsirkadnyi ritm aktivnosti sistemy gipotalamus-gipofiz-kora nadpochechnikov)** M G Kolpakov, E M Kazin (Akademiia Meditsinskikh Nauk, SSSR, Novosibirsk, USSR), and G G Avdeev (Gosudarstvennyi Universitet, Kemerovo, USSR) *Uspekhi Fizicheskikh Nauk*, vol 7, Jan-Mar 1976, p 8-23 125 refs In Russian

The paper is a review of research work regarding the circadian variations in the functions of the system hypothalamus-hypophysis-

adrenal cortex, with particular reference to the various possible endogenous and exogenous oscillators of the adrenocortical cycle. The mechanisms involved in the formation of circadian corticosteroidal response to stress factors are elucidated. It is shown that the system hypothalamus-hypophysis-adrenal cortex as one of the leading adaptive systems in the body exhibits a pronounced circadian periodicity in the functioning of its central and peripheral structures S D

**A76-27947 # Muscular heat production in warm-blooded animals (Myshechnyi termogenez u gomoiotermnykh zhivotnykh)** V V Khaskin (Akademiia Nauk SSSR, Institut Fiziologii, Novosibirsk, USSR) *Uspekhi Fizicheskikh Nauk*, vol 7, Jan-Mar 1976, p 24-46 145 refs In Russian

Published data are reviewed to combine thermodynamical, biochemical, and physiological approaches for the analysis of muscular heat production in warm-blooded animals. The nature of variations in the heat production of skeletal muscles during thermoregulatory reactions and adaptation of an animal to cold is examined, and a concept of physiological effectiveness of heat formation is introduced. Heat production of an active muscle is represented as a function of the number of elementary contraction events, thermochemical equivalent of ATP splitting in an elementary act and phosphorylation factor (P/O). It is shown that changes in P/O are of thermoregulatory significance and that muscular heat production may be attributed to noncontractile thermogenesis only to the extent that ATP splitting in the muscle is not accompanied by muscular contraction. The relative heat-producing importance of pertinent reactions is actually enhanced when an animal adapts itself to cold S D

**A76-27948 # The functional role of slow potential rhythms and order impulse flows (O funktsional'noi roli medlennykh kolebani potentsiala i uporiadochennykh potokov impul'satsii)** G I Shul'gina (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR) *Uspekhi Fizicheskikh Nauk*, vol 7, Jan-Mar 1976, p 47-66 161 refs In Russian

Data are presented on the nature and functional significance of slow potential rhythms and their behavior during the active state of the brain. The discussion covers the correlation of slow biopotentials and the impulse activity of neurons, the role of recurrent inhibition in the organization of background and evoked potentials, as well as in the decrease of excitability and mismatching of biopotential frequencies in various structures of the brain when developing internal inhibition. There is enough evidence to support the hypothesis of depression of recurrent inhibition during the formation of a conditioned reflex as one of the fundamental mechanisms for the action of a reinforcing stimulus. It is suggested that enhancement of the ordering of interacting impulse flows is a qualitative distinctive feature of the active state of the brain as compared to the period of relative rest or inhibition S D

**A76-27989 \* Reflex limb dilatation following norepinephrine and angiotensin II in conscious dogs** S F Vatner (Harvard University, Peter Bent Brigham Hospital, Children's Hospital, Boston, New England Regional Primate Research Center, Southborough, Mass.) and R J McRitchie *American Journal of Physiology*, vol 230, Mar 1976, p 557-563 19 refs NASA supported research, Grants No PHS-HL-15416, No PHS-HL 17459, No PHS-HL 10436009

The extent to which norepinephrine (NE) and angiotensin II (AN) constrict the mesenteric, renal, and iliac beds in conscious dogs is evaluated with a view to elicit opposing reflex actions tempering the vasoconstriction in the limb of the animals tested. The afferent and efferent mechanisms mediating this reflex are analyzed. It is shown that intravenous NE and AN cause striking reflex iliac dilatation in the limb of the conscious dog. The afferent arc of this reflex involves both arterial baroreceptor and vagal pathways, whereas the efferent mechanism involves an interaction of alpha-adrenergic and histaminergic receptors S D

**A76-27990 \*** Norepinephrine turnover in heart and spleen of 7, 22, and 34 C-acclimated hamsters S B Jones and X J Musacchia (Missouri, University, Columbia, Mo.) *American Journal of Physiology*, vol 230, Mar 1976, p 564-568 23 refs Research supported by the University of Missouri, Grant No NGL-26 004-021

The relationship of norepinephrine (NE) concentration and endogenous turnover rates in both myocardial and spleen tissues in the golden hamster is examined as a function of chronic exposure to either high or low ambient temperatures. Changes in myocardial and spleen NE turnover values are discussed in terms of functional alterations in sympathetic nerve activity and the importance of such changes in temperature acclimation. It is found that acclimation of hamsters to 7 C for 7-10 weeks results in decreased myocardial NE concentration and an apparent increase in myocardial NE turnover. In contrast, exposure to 34 C for 6-8 weeks results in increased myocardial NE concentration and an apparent decrease in NE turnover in both myocardial and spleen tissues. The implication of altered NE synthesis is that sympathetic nerve activity is reduced with heat acclimation and is enhanced with cold acclimation. S D

**A76-27991** Vascular responses to short-term systemic hypoxia, hypercapnia, and asphyxia in the cat M L Weissman, E H Rubinstein, and R R Sonnenschein (California, University, Los Angeles, Calif.) *American Journal of Physiology*, vol 230, Mar 1976, p 595-601 30 refs Research supported by the American Heart Association, NSF Grant No GB-41390, Grants No NIH-HL-05157, No NIH-HL 05696

**A76-27992** Frequency-force relationships of mammalian ventricular muscle in vivo and in vitro M L Kahn, F Kavalier, and V J Fisher (New York University, U.S. Veterans Administration Hospital, New York, Downstate Medical Center, Brooklyn, N.Y.) *American Journal of Physiology*, vol 230, Mar 1976, p 631-636 23 refs

**A76-27993 \*** Propranolol and pyrogen effects on shivering and nonshivering thermogenesis in rats B A Horwitz and G E Hanes (California, University, Davis, Calif.) *American Journal of Physiology*, vol 230, Mar 1976, p 637-642 13 refs Grant No NGR 04-005-099

The influence of pyrogen and propranolol (a beta-adrenergic antagonist) on shivering and nonshivering thermogenesis (NST) in male rats exposed to 24-25 C and 17-18 C is studied. It is found that intravenous injection of an exogenous pyrogen into rats exposed to 24-25 C elicited a thermogenic response manifested by elevated body temperature, rate of oxygen consumption, and shivering activity, and that propranolol markedly diminished the pyrogen induced increases in oxygen consumption and colonic temperature, with little changes in shivering activity. In contrast, in cold-exposed rats, propranolol did not significantly affect the pyrogen evoked thermogenesis, shivering rather tended to increase when NST was blocked. It is suggested that the fibrile responses evoked by exogenous pyrogen involve differential effects on the two modes of heat production. The assumption that pyrogen acts at a site common to both shivering and nonshivering pathways or that it uniformly alters the individual set points and/or thresholds for both thermogenic effectors is therefore unlikely in the light of the data presented. S D

**A76-27994** Nonshivering thermogenesis induced by repetitive cooling of spinal cord in the rat M Banet and H Hensel (Marburg, Universität, Marburg an der Lahn, West Germany) *American Journal of Physiology*, vol 230, Mar 1976, p 720-723 16 refs

**A76-27995** Blood flow and relative tissue PO<sub>2</sub> of brain and muscle - Effect of various gas mixtures H R Weiss, J A Cohen, and L A McPherson (New Jersey, College of Medicine and Dentistry, Piscataway, N.J.) *American Journal of Physiology*, vol 230, Mar 1976, p 839-844 27 refs Grant No NIH-HL 16134

The effects of inspiring hypoxic and/or hypercapnic gas mix-

tures on tissue perfusion and tissue oxygen tension of brain and muscle were studied in 76 anesthetized rats. It is found that brain blood flow increased to a greater degree and tissue oxygen tension decreased less than muscle under both hypoxia and hypoxic-hypercapnia conditions. The effects of hypercapnia alone are also greater in brain. It appears that tissue oxygen tension is not the only controlled variable in metabolic autoregulation, and further evidence is required in this respect. S D

**A76-28006** Evolutionism and the origins of life (L'évolutionnisme et les origines de la vie) J Ninio (CNRS, Paris, France) *La Recherche*, vol 7, Apr 1976, p 325-334 24 refs In French

Tutorial article surveying new theories and research on the origins of life from unorganized inorganic matter, and related epistemological problems. Preconditions for the origin of genetic code material, collective transformations of biogenetic material (as against individual or isolated mutations), and environmental states of prebiotic epochs differing appreciably from familiar life-supporting environments are considered. Game theory and automation theory applied to competition between incipient life forms and the probability that the earth (among planets of stellar systems) presents unique conditions (required N plus k conditions, where the N conditions are prerequisite to elemental life processes) for initiating life processes are discussed. Transformation of prebiotic glop into biochemical and stereochemical molecules and macromolecules is examined. R D V

**A76-28037** Left ventricular performance in coronary artery disease evaluated with systolic time intervals and echocardiography R S Stack, C C Lee, B P Reddy, M L Taylor, and A M Weissler (Wayne State University, Harper Hospital, Detroit, Mich.) *American Journal of Cardiology*, vol 37, Mar 4, 1976, p 331-339 23 refs

**A76-28038** Cross-sectional echocardiography in evaluating patients with discrete subaortic stenosis A E Weyman, H Feigenbaum, R A Hurwitz, D A Girod, J C Dillon, and S Chang (Indiana University, Krannert Institute of Cardiology, Indianapolis, Ind.) *American Journal of Cardiology*, vol 37, Mar 4, 1976, p 358-365 10 refs Research supported by the Herman C Krannert Fund and Indiana Heart Association, Grants No NIH-HL 09815, No NIH-HL 06308, No NIH-HL-05363, No NIH-HL-05749

**A76-28039** Quantitative radionuclide angiocardiology - Detection and quantitation of left to right shunts J Askenazi, D S Ahnberg, E Korngold, C G LaFarge, D L Maltz, and S Treves (Children's Hospital Medical Center, Harvard University, Boston, Mass.) *American Journal of Cardiology*, vol 37, Mar 4, 1976, p 382-387 Grant No NIH 5-P01 HL-10436-07

In 105 patients detection and quantitation of left to right shunts was performed using quantitative radionuclide angiocardiology. The radionuclide angiocardigrams were acquired and analyzed by a gamma camera interfaced to a digital computer system. Pulmonary to systemic flow (Qp/Qs) ratios were calculated by analysis of pulmonary time-activity histograms using a gamma variate model. All patients were studied with cardiac catheterization, left ventricular angiocardiology, and radionuclide angiocardiology. The radionuclide method allowed precise detection and quantitation of left to right shunts with a Qp/Qs ratio of 1.2 to 3.0. There was good agreement between the Qp/Qs ratio calculated by oximetry at cardiac catheterization and radionuclide angiocardiology. The information gathered with this nontraumatic method appears sufficiently reliable to be used in the management of patients. (Author)

**A76-28040** Electrophysiologic effects of procainamide in subtherapeutic to therapeutic doses on human atrioventricular conduction system J B Ogunkelu, A N Damato, M Akhtar, C P Reddy, A R Caracta, and S H Lau (U.S. Public Health Service Hospital, Staten Island, N.Y.) *American Journal of Cardiology*, vol 37, Apr 1976, p 724-731 25 refs Grant No NIH HL-12536 05

**A76-28041**      **Intraatrial conduction disturbances - Vectorcardiographic patterns** O Zoneraich (Long Island Jewish Medical Center, Jamaica, N.Y.) and S Zoneraich (New York, State University, Stony Brook, N.Y.) *American Journal of Cardiology*, vol 37, Apr 1976, p 736-742 20 refs

Frank P loop vectorcardiograms were recorded in 30 normal subjects and in 40 patients who had intraatrial conduction disturbances alone or in association with cardiac disease. High magnification of the P loop permitted accurate measurement of the P loop duration, magnitude and direction. High frequency recordings allowed optimal evaluation of the notches, bites and conduction delays in the PsE loop. Four vectorcardiographic patterns have been selected as counterparts of the four types of enlarged P waves seen in electrocardiograms of patients with atrial conduction disturbances. When intraatrial conduction disturbances coexisted with left atrial enlargement, the PsE loop was larger and smoother. The role of partial or complete block in the specific internodal or interatrial pathways is discussed. (Author)

**A76-28042**      **Role of echocardiography in patients with coronary artery disease** H Feigenbaum, B C Corya, J C Dillon, A E Weyman, S Rasmussen, M J Black, and S Chang (Indiana University, Krannert Institute of Cardiology, Indianapolis, Ind.) *American Journal of Cardiology*, vol 37, Apr 1976, p 775-786 33 refs. Research supported by the Herman C Krannert Fund and Indiana Heart Association, Grants No NIH HL 09815 08, No NIH HL 06308, No NIH HL-05749

One of the major consequences of coronary artery disease is injury to the left ventricle. Some echocardiographic techniques are reviewed, with special emphasis on their possible clinical value in detecting ventricular abnormalities and assessing the severity of myocardial damage. Echocardiographic examination is discussed relative to the transducer along the left sternal margin and in the subxiphoid area. The detection of abnormal wall motion is examined for anterior left ventricular wall motion and wall motion in transient ischemia. Particular attention is given to the detection of altered left ventricular shape by cross-sectional echocardiography. A dilated left ventricular dimension in the vicinity of the mitral valve seems to be an ominous finding both in patients with acute myocardial infarction and in patients with chronic coronary disease being considered for possible surgery. Many of the techniques are investigative and need further substantiation. However, there is enough evidence to predict that echocardiography will play an increasingly important role in the management of patients with coronary artery disease. S D

**A76-28043**      **Myocardial imaging in the noninvasive evaluation of patients with suspected ischemic heart disease** B Pitt and H W Strauss (Johns Hopkins Medical Institutions, Baltimore, Md.) *American Journal of Cardiology*, vol 37, Apr 1976, p 797-806 30 refs. Grants No PHS-GM-10548, No PHS-PH-43-NHLI-67-1444

Three noninvasive tracer techniques for evaluating patients with ischemic heart disease are outlined. The first technique is myocardial perfusion imaging with tracers such as K-43 or TI-201 that concentrate in myocardial cells in proportion to blood flow. In this procedure areas of ischemia or infarction appear as a zone of decreased tracer concentration. The second technique employs tracers such as technetium-99m labeled pyrophosphate, tetracycline or glucoheptonate that concentrate in acutely damaged tissue. In this procedure areas of acute infarction appear as zones of increased tracer concentration. The third technique is referred to as the gated cardiac blood pool scan which permits measurement of left ventricular ejection fraction and regional myocardial wall motion. The tracer techniques described are still relatively new and require further investigation. S D

**A76-28480 \***      **Unified Mars detection system** J P Martin, B Kok, R Radmer (Martin Marietta Aerospace, Denver, Colo.), and R D Johnson (NASA, Ames Research Center, Bioscience Laboratory, Moffett Field, Calif.) In *Future space activities, Proceedings of the Thirteenth Goddard Memorial Symposium*, Washington, D.C., April

11, 1975

Tarzana, Calif., American Astronautical Society, 1976, p 123-149

A life-detection system is described which is designed to detect and characterize possible Martian biota and to gather information about the chemical environment of Mars, especially the water and amino acid contents of the soil. The system is organized around a central mass spectrometer that can sensitively analyze trace gases from a variety of different experiments. Some biological assays and soil-chemistry tests that have been performed in the laboratory as typical experiment candidates for the system are discussed, including tests for soil-organism metabolism, measurements of soil carbon contents, and determinations of primary aliphatic amines (amino acids and protein) in soils. Two possible test strategies are outlined, and the operational concept of the detection system is illustrated. Detailed descriptions are given for the mass spectrometer, gas inlet, incubation box, test cell modules, seal drive mechanism, soil distribution assembly, and electronic control system. F G M

**A76-28500**      **Human stereopsis: A psychophysical analysis** W L Gulick (Hamilton College, Clinton, N.Y.) and R B Lawson (Vermont, University, Burlington, Vt.) Research supported by the National Science Foundation, US Public Health Service and University of Delaware Research Foundation, NSF Grants No GB 2497, No GB-30579, Grants No PHS-2-T01-MH-11983, No PHS R01-00849. New York, Oxford University Press, Inc., 1976 298 p 213 refs \$15

The work deals with classical theories of stereoscopic vision along with psychophysical studies of the perceptual effects brought about by manipulations of several stimulus parameters. Emphasis is placed on retinal correspondence, form disparity, stereoscopic contours, and experiments with interposition. Other topics include stereoscopic organizations, disparity and directional separation, binocular locking and dichopticity, and stereoscopic size distance relationships. A computer program written in the BASIC language is presented for calculating the retinal disparity of a given point in space when the attitude of the eyes is also specified, its use being limited to points that lie in a horizontal plane that includes the centers of the eyes. S D

**A76-28527 #**      **Some topics in aviation ergonomics (Niektóre zagadnienia ergonomii lotniczej)** J M Morawski (Instytut Lotnictwa, Warsaw, Poland) In *Ergonomics in aviation, National Scientific-Technological Conference*, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings. Warsaw, Instytut Lotnictwa, 1975, p 7-19 15 refs. In Polish

Structure of the pilot-aircraft system as a cybernetic system, evaluation criteria, reliability, accuracy, and other aspects of aviation ergonomics are discussed. Human-machine interaction is examined from the standpoint of semantic information theory. Natural inclinations of the human operator and their importance in the overall system design are emphasized. The value of subjective opinions and responses of the operator is pointed out. Semantic information theory is applied to the problems of crew training and effective use of training schools on the ground. R D V

**A76-28528 #**      **Psychological aspects of the human role in an aircraft in the light of the development of aviation (Psychologiczne problemy roli człowieka w samolocie w świetle rozwoju lotnictwa)** P Pokinko (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) In *Ergonomics in aviation, National Scientific-Technological Conference*, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings. Warsaw, Instytut Lotnictwa, 1975, p 20-30 14 refs. In Polish

Logical and historical stages in the development of human-machine relations as pilot-aircraft relations are delineated. Four stages or levels of pilot aircraft interaction and sharing of control functions are distinguished: (1) pilot makes all decisions, (2) semiautomatic control and regulation, (3) nearly complete automatic control in the near future, (4) complete automation. Data acquisition by the pilot and by sensors, and data processing by the pilot and by automatic devices, and executive functions and decision making are

evaluated in terms of the relative advantages of human and machine Functions of the human operator as an integral link in the pilot-aircraft system at different levels of complexity of control and automation are examined  
R D V

**A76-28529 #** Research on the load on the pilot's organism under various jet aircraft flight conditions (Badania nad obciążeniem ustroju pilota w różnych warunkach lotu na samolotach odrzutowych) Z Sarol (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) In Ergonomics in aviation, National Scientific-Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings Warsaw, Instytut Lotnictwa, 1975, p 31-40 6 refs In Polish

Research on how flight activities affect cardiorespiratory metabolism is reviewed The activities of the cardiac and respiratory systems in jet flight, in response to accelerations, difficulties, and sensed imminent dangers, are studied on the basis of ECG records, variations in heart rate, systolic and diastolic pressure, ventilation of the lungs, flattening of T waves and rise of P waves on the ECG Respiratory and ECG responses to low-level tree-hopping jet flight situations are also examined  
R D V

**A76-28530 #** Retention of selected physiological indicators in pilots in the course of agricultural flights (Zachowanie się wybranych wskaźników fizjologicznych u pilotów podczas lotów agrotechnicznych) L Markiewicz, D Koradecka, and M Konarska (Centralny Instytut Ochrony Pracy, Warsaw, Poland) In Ergonomics in aviation, National Scientific-Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings Warsaw, Instytut Lotnictwa, 1975, p 41-52 In Polish

Stress on the organism of pilots maneuvering fixed wing or rotary-wing aircraft in crop dusting and sowing operations, with abrupt changes in terrain and sharp turns required, is studied on the basis of telemetered heart rate, tremograms, indications of muscle fatigue (particularly, flexor muscles of the fingers), and response to vibrations Comparisons are made of data for low level flight over even terrain and nap-of the earth flight over hilly terrain Responses in fixed-wing flight and helicopter flight are also contrasted Criteria are proposed for optimization of piloting conditions in this type of service Restrictions on interpretation of the data are stated, and data are presented in tabular and graphical form  
R D V

**A76-28531 #** Research on psychological stress experienced by pilots while carrying out agricultural flight missions (Badania obciążenia psychicznego pilotów w czasie wykonywania usług agrolotniczych) I Franaszczuk (Centralny Instytut Ochrony Pracy, Warsaw, Poland) In Ergonomics in aviation, National Scientific-Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings Warsaw, Instytut Lotnictwa, 1975, p 53-63 In Polish

The effect of in-flight stress on the information-handling capacity and psychomotor responses of pilots engaged in crop-dusting and sowing flights is studied Attention is given to attentiveness and fatigue, ability to divide or withdraw attention, eye/hand coordination, reaction time to visual and audible signals, information, and alarms, and adverse reactions to agricultural chemicals Audiograms of pilot auditory response are cited Restrictions on psychomotor response to be taken into account by equipment designers are listed Factors aggravating in-flight stress under agricultural flight conditions are listed  
R D V

**A76-28532 #** Speech intelligibility under acoustic conditions of pilot performance (Zrozumialosc mowy w akustycznych warunkach pracy pilota) J Nowicki (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) In Ergonomics in aviation, National Scientific Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings Warsaw, Instytut Lotnictwa, 1975, p 64-72 5 refs In Polish

The auditory responses of pilots operating under cockpit noise

conditions was tested The tests were designed to distinguish cockpit noise in jet flight and propeller-driven flight, speech (using trisyllable word sequences) and Morse code symbols, different background noise patterns, and normal hearing as against impaired hearing The ability of pilots to filter out audible noise under flight conditions was tested Chronic trauma to auditory organs under flight conditions is taken into account  
R D V

**A76-28533 #** Retention of perception and pilot's motor-visual reaction time during +Gz accelerations (Zachowanie się zdolności spostrzegania i czasu reakcji wzrokowo-ruchowej pilota podczas działania przyspieszeń +Gz) J Domaszuk and M Wojtkowiak (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) In Ergonomics in aviation, National Scientific-Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings Warsaw, Instytut Lotnictwa, 1975, p 73-80 9 refs In Polish

Perceptivity and attentiveness of aircraft pilots were tested with the aid of tachistoscopes and stroboscopic lamps, with subjects placed in an overloaded centrifuge to provide acceleration A programmed light stimulus was designed for testing reaction times Reaction time was evaluated in terms of the centrifuging period at a 4.5 G level up to the acceleration tolerance limit (with narrowing of the field of vision in evidence) The changes observed are transitory in nature and dissipate when the accelerations are removed The degree of impairment in perception and the reaction time depend on the magnitude of the acceleration and on the acceleration tolerance limit  
R D V

**A76-28534 #** Modern psychological research techniques for testing pilots under dynamic conditions (Współczesne metody badań psychologicznych pilotów w warunkach dynamicznych) R Błoszczyński (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) In Ergonomics in aviation, National Scientific-Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings Warsaw, Instytut Lotnictwa, 1975, p 81-96 5 refs In Polish

Pilot errors in handling and responding to instruments are examined as a frequent cause of accidents, and special attention is centered on objective techniques for measuring and patterning instrument handling activities and assessing the level of activation of the pilot's organism The design of several simulators and the tests they facilitate are discussed in detail Various psychomotor, cardiac, respiratory, palm pressure, and visual reactions and reaction times are indicated, including visual responses to visual signals, kinetic responses to activate indicated instruments and levers, and responses to alarm annunciations The techniques developed are amenable to application in other human-machine systems  
R D V

**A76-28535 #** Psychophysiological research on pilots' performance level when flooded by information of different kinds in different forms (Psychofizjologiczne badania poziomu funkcjonowania pilotów w warunkach obciążenia informacją o różnej modalności) R Błoszczyński (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) In Ergonomics in aviation, National Scientific-Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings Warsaw, Instytut Lotnictwa, 1975, p 97-107 In Polish

Changes in the activity of pilots under laboratory experimental conditions while two different activities have to be carried out were studied The conflicting information included (1) acquisition, processing, and display of verbal information, (2) simultaneous activity involving visual tracking and psychomotor compensation in order to keep a light spot at the center of an oscilloscope tube A specially designed simulator, an automatic device for recording temperature and systolic and diastolic pressures and pulse rate, and a tape recorder with earphones were used Efficiency and reaction times were found to vary greatly with individual pilots tested  
R D V

**A76-28536 #** Methods and results of research on perceptual and decision-making processes in pilots under laboratory conditions (*Metody i wyniki badań procesów percepcyjno-decyzyjnych pilotów w warunkach laboratoryjnych*) P Pokinko and J Terelak (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) In *Ergonomics in aviation, National Scientific-Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings* Warsaw, Instytut Lotnictwa, 1975, p 108-124 In Polish

Feedback between perceptions and decisions by pilots and executive processes carried out in acting on those decisions and perceptions was studied in a laboratory setting using electronic display and test equipment. Silhouette, photographic, audiovisual, and instrument-reading displays were presented to pilot-subjects. Test results were analyzed statistically. Pilots' perceptual and decision-making responses were found to be highly individual, even independent of experience, training, and age. Responses within a specified short time interval were found to deteriorate with age.

R D V

**A76-28537 #** Determination of the degree of required human motor activity when operating in a sitting position (*Określenie stopnia niezbędnej aktywności ruchowej człowieka przy pracy w pozycji siedzącej*) D Sek (Instytut Wzornictwa Przemysłowego, Warsaw, Poland) In *Ergonomics in aviation, National Scientific-Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings* Warsaw, Instytut Lotnictwa, 1975, p 125-137 18 refs In Polish

The importance of motor activity to counteract deleterious effects of continuous sitting (a by-product of modern labor-saving methods and modes of labor) on performance and health is considered as a major problem in ergonomics. An international collaborative study on optimizing the amount of motor activity in a sedentary work position is described. Efficiency, minimization of error and loss of attention, hand tremors, muscular discomfort, time of day, and other factors are considered.

R D V

**A76-28538 #** The problem of vibration in aviation (*Zagadnienie wibracji w lotnictwie*) M E Jurczak (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) In *Ergonomics in aviation, National Scientific-Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings* Warsaw, Instytut Lotnictwa, 1975, p 138-147 16 refs In Polish

Generation of vibrations in aircraft, the physical characteristics of vibrations, and transmission of vibrations to the pilot's body are discussed. Various aspects of the organism's response to vibrations and ways of offsetting the pathogenic effects of vibrations on the organism are also dealt with. Special attention is given to the effects of helicopter rotor vibrations.

R D V

**A76-28539 #** Selected problems in the identification of the effect of vibrations on the human organism (*Wybrane problemy identyfikacji wpływu drgań na organizm ludzki*) K Zarzecki (Wojskowy Instytut Higieny i Epidemiologii, Warsaw, Poland) In *Ergonomics in aviation, National Scientific-Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings* Warsaw, Instytut Lotnictwa, 1975, p 148-154

21 refs In Polish

Vibration-induced changes in metabolism and vibration-induced body malfunctions are discussed. The wide range of frequencies and amplitudes encountered, horizontal and vertical vibrations, vibration impacts, and vibration resonance with human body parts (cerebral cortex, heart, blood pressure, endocrine glands, abdominal cavity, spine, major internal organs, thorax, the nervous system, and others) are discussed.

R D V

**A76-28553 #** Anthropometric data for design (*Dane antropometryczne do projektowania*) A Batogowska (Instytut Wzornictwa Przemysłowego, Warsaw, Poland) In *Ergonomics in aviation, National Scientific-Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings* Warsaw, Instytut Lotnictwa, 1975, p 290-303 In Polish

The paper discusses the use of the 'Anthropometric Atlas of the Adult Population of Poland for Design Uses', a work which contains silhouettes of human figures in various positions, static and dynamic, from which general scale parameters can be deduced for the design of a wide range of machines and equipment. The charts are based on a statistical study of 100,000 adults, and human sketches in the various positions, interacting with typical industrial equipment, are provided for the median, fifth percentile, and ninety-fifth percentile anatomical dimensions.

P T H

**A76-28554 #** Determination of the spatial compass of the upper extremities (*Określenie przestrzennej strefy zasięgu kończyn górnych*) E Nowak (Instytut Wzornictwa Przemysłowego, Warsaw, Poland) In *Ergonomics in aviation, National Scientific-Technological Conference, 1st, Warsaw, Poland, March 17-19, 1975, Proceedings* Warsaw, Instytut Lotnictwa, 1975, p 304-314 11 refs In Polish

The paper gives a brief description of a method for determining the zone of reach of the upper extremities of the human body in various working positions. An instrument is described which facilitates such measurements in several fundamental planes. Some sample measurements on male and female workers of various kinds are summarized.

P T H

**A76-28620** Measurement of Krogh's diffusion constant of CO<sub>2</sub> in respiring muscle at various CO<sub>2</sub> levels - Evidence for facilitated diffusion T Kawashiro and P Scheid (Max-Planck-Institut für experimentelle Medizin, Göttingen, West Germany) *Pflügers Archiv*, vol 362, no 2, 1976, p 127-133 20 refs

**A76-28621** Biological balance of sodium and potassium - A control system with oscillating correcting variable H Mann, S Stiller, and R Korz (Rheinisch-Westfälische Technische Hochschule, Aachen, West Germany) *Pflügers Archiv*, vol 362, no 2, 1976, p 135-139 25 refs

The rhythm of renal sodium and potassium excretion was measured in 4 h-intervals in 12 subjects. Each person exhibited clear circadian variations of each variable with a maximum between 8 a.m. and 4 p.m. In each subject and for both circadian rhythms the oscillation mean was correlated to the range of oscillation (amplitude). Increase in sodium or potassium excretion during 1 day resulted in an increase of oscillation range. The oscillation means of sodium and potassium periodicity did not correlate. The properties of biological control systems with oscillating correcting variables are comparable to those of technical control systems. The significance of circadian rhythm for the control of electrolyte balance is indicated.

(Author)

**A76-28745** Inhibitory binocular interaction in human vision and a possible mechanism subserving stereoscopic fusion K H Ruddock and E Wigley (Imperial College of Science and Technology, London, England) *Nature*, vol 260, Apr 15, 1976, p 604-606 11 refs

The interactions between visual signals produced in reaction to two different stimuli presented one to each eye were investigated. The grating adaptation effect (Gillinski, 1968) was measured with test and adaptation gratings, matched in orientation and frequency, presented to one eye and a further grating stimulus (the 'conditioning grating') presented to the other. It was found that when the conditioning grating was in the approximate spatial frequency range 1.4 cycles per degree, it suppressed the adaptation for all spatial frequencies of the test and adaptation gratings, except when these frequencies were the same. No low frequency inhibition of this type was seen when the adaptation and test gratings were presented to different eyes. The inhibition of the grating adaptation effect associated with the conditioning grating apparently arises from an interaction between the supra threshold adaptation and conditioning gratings during simultaneous presentation to different eyes. This binocular suppression effect is limited to gratings oriented in a vertical direction, suggesting that it is involved in the stereoscopic fusion mechanism.

C K D

**A76-28750**      **The effects of vibration on manual control performance** C H Lewis and M J Griffin (Southampton, University, Southampton, England) *Ergonomics*, vol 19, Mar 1976, p 203-216 21 refs

A taxonomic model of human operator processes contributing to performance in vibration is used to study coordinated manual tracking during vibration. Experiments are carried out in which twelve subjects were required to perform zero-order pursuit tracking of a quasi-random forcing function in a horizontal axis with free-moving and spring-centered control levers. Performance is measured in terms of information channel capacity and frequency dependent error. It is found that the subjects were better able to maintain tracking performance when isometric cues were provided in the control. It is suggested that interference with kinesthetic feedback mechanisms may be a major reason why vibration degrades tracking performance. S D

**A76-28766**      **Study of the branchings of a vascular bed (Etude des embranchements du lit vasculaire)** M Lefort (Nancy, Ecole Nationale Supérieure de la Métallurgie et de l'Industrie des Mines, Nancy, France), J-F Stoltz, and A Larcen (Centre Hospitalier Universitaire, Nancy, France) *Journal de Mécanique*, vol 15, no 1, 1976, p 133-154 11 refs. In French. Direction des Recherches et Moyens d'Essais Contract No 72/34 238-00-480-75-01

The bifurcation of blood vessels was studied using a vascular bed model constructed of glass tubes. The blood was modeled by a heterogeneous non-Newtonian fluid which was pulsed through the bifurcated elastic tubes, the pulse amplitude decreasing with distance traveled. The aim of the research was to investigate the loss of flow intensity (the distribution of flow rates) and the influence zone (in the laminar case, the right section of the principal vessel which branches out). The experiment consisted of the visualization of the flow of a water-glycerine mixture through glass tubes with plastic bifurcations, with fluid injection performed by means of hypodermic needles. The geometry of the influence zone was investigated. B J

**A76-28769**      **Rod-cone independence in dark adaptation** M M Hayhoe, D I A MacLeod (California, University, La Jolla, Calif.), and T A Bruch (Florida State University, Tallahassee, Fla.) *Vision Research*, vol 16, no 6, 1976, p 591-600 44 refs. NSF Grant No GU 2612, Grants No NIH EY-00684, No NIH EY 01541-01

The afterimages visible after cones have recovered in dark adaptation fade against any steady background, but may be revived by a sudden change in the intensity or wavelength of the background. However, when a change of background wavelength is not detectable by rods, it does not revive such an afterimage, showing that sensitivity to cone stimuli has not been affected by bleaching the rods. To revive a rod afterimage, an increase of background intensity must exceed the increment threshold of the rods. To examine the effects of cone bleaching upon rod sensitivity, dark adaptation curves following red and green bleaching exposures equal for rods are compared. The curves are indistinguishable. (Author)

**A76-28770**      **Threshold elevation following adaptation to coloured gratings.** B N Timney, T A Gentry, D Skowbo, and R B Morant (Brandeis University, Waltham, Mass.) *Vision Research*, vol 16, no 6, 1976, p 601-607 25 refs. Defense Research Board of Canada Grant No 9425-12

In two experiments, luminance thresholds were measured for horizontal or vertical gratings of various wavelengths, following adaptation to gratings which were of the same or different orientation, and of the same or different wavelength. In the first experiment, in which the adaptation period was relatively brief, there was a small orientation-specific threshold elevation effect but only minimal evidence that this was wavelength specific. In the second experiment, which involved prolonged adaptation, there was a large orientation-specific threshold elevation but no evidence for wavelength specificity. (Author)

**A76-28771**      **Extraretinal information in corrective saccades and inflow vs outflow theories of visual direction constancy** W L Shebilske (Virginia, University, Charlottesville, Va.) *Vision Research*, vol 16, no 6, 1976, p 621-628 36 refs. NIH-supported research

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## STAR ENTRIES

**N76-20795\*+ George Washington Univ Washington D C**  
**Dept of Medical and Public Affairs**  
**SCIENTIFIC PUBLICATIONS AND PRESENTATIONS**  
**RELATING TO PLANETARY QUARANTINE VOLUME 5**  
**THE 1975 SUPPLEMENT**

Frank D Bradley Apr 1976 35 p  
 (Contract NASw-2890)  
 (NASA-CR-146562 GWU SCD-76 5P Vol-5-Suppl) Avail  
 NTIS HC \$4 00 CSCL 06M

Documents pertaining to planetary quarantine are listed. An author index is given along with a listing of books and journals containing related material. JMS

**N76-20796\*# Kanner (Leo) Associates Redwood City Calif**  
**CALCULATION OF MUSCULAR POWER IN FLAPPING**  
**FLIGHT OF BIRDS FROM KINEMATIC AND MORPHOLOGICAL**  
**DATA (STUDIES ON BIOPHYSICS AND PHYSIOLOGY**  
**OF AVIAN FLIGHT 3)**

H Oehme Washington NASA Mar 1976 54 p refs Transl into ENGLISH from Zool Jahrb Abt Allgem Zool Physiol Tiere (East Germany) v 79 no 3 1975 p 425-458  
 (Contract NASw-2790)  
 (NASA-TT-F-16902) Avail NTIS HC \$4 50 CSCL 06C

An airscrew-type calculation is employed to determine the power output of birds pectoral muscles in level flight without recourse to aerodynamic force coefficient. Downstroke power is derived from required lift point of application of tangential force along wing and angular velocity. Kinematic data (duration of downstroke duration of accelerated rotation at start of downstroke and duration of total cycle flight speed stroke angle stroke angle bisector) are obtained from films. Sample flights of pigeons and doves are analyzed and compared with metabolic-physiological results confirming the usability of this method. In both species the power output per unit weight of the pectoral muscles (0.26-0.60 HP/kg) under prolonged load is 10 to 20 times that of mammalian muscles except probably for the flight muscles of bats. Author

**N76-20797\*# Martin Marietta Corp Denver Colo**  
**UREA/AMMONIUM ION REMOVAL SYSTEM FOR THE**  
**ORBITING FROG OTOLITH EXPERIMENT Final Report**  
 Jon R Schulz and Robert T Anselmi Jan 1976 123 p refs  
 (Contract NAS2-8165)  
 (NASA-CR-137833 MCR-76-6) Avail NTIS HC \$5 50 CSCL 06C

The feasibility of using free urease enzyme and ANG-101 ion exchange resin to remove urea and ammonium ion for space system waste water applications was studied. Specifically examined is the prevention of urea and ammonia toxicity in a 30-day Orbiting Frog Otolith (OFO) flight experiment. It is shown that free urease enzyme used in conjunction with ANG-101 ion-exchange resin and pH control can control urea and ammonium ion concentration in unbuffered recirculating water. In addition the resin does not adversely effect the bullfrogs by lowering the concentration of cations below critical minimum levels. Further investigations on bioburden control frog waste excretion on an OFO diet a trade-off analysis of methods of automating the urea/ammonium ion removal system and fabrication and test of a semiautomated breadboard were recommended as continuing efforts. Photographs of test equipment and test animals are shown. Author

**N76-20798\*# Missouri Univ Columbia Dalton Research Center**

**THE ROLE OF DEPRESSED METABOLISM IN INCREASED RADIO-RESISTANCE Semiannual Status Report**

X J Musacchia Mar 1975 43 p refs

(Grant NGL-26-004-021)

(NASA-CR-146512) Avail NTIS HC \$4 00 CSCL 06C

The results of experiments on hamsters and rats to determine physiological responses to various temperature conditions are presented. The experimental methods described are considered to be applicable to future mammalian experiments in space. Renal function was examined in the golden hamster as a function of body temperature. Hamsters were also acclimated to heat and metabolic rates body temperature skin temperature cardiac distribution and whole body hematocrits were measured. In addition the effects of heat stress on the intestinal transport of sugars in the hamster and rat were studied. The biological effects of prolonged space flight and methods of simulating weightlessness are also discussed. DML

**N76-20799\*# Hardin-Simmons Univ Abilene Tex Science Research Center**

**RESPONSE OF SELECTED MICROORGANISMS TO EXPERIMENTAL PLANETARY ENVIRONMENTS Semiannual Progress Report, 1 Jul - 31 Dec 1975**

Terry L Foster S J S Helms L E Kirschner W C Stevens L K Talley and L Winans Jr Feb 1976 42 p refs  
 (Grant NGR-44-095-001)

(NASA-CR-146666 SAPR-7) Avail NTIS HC \$4 00 CSCL 06M

The anaerobic utilization of phosphite or phosphine and the significance of this conversion to potential contamination of Jupiter were investigated. A sporeforming organism was isolated from Cape Canaveral soil which anaerobically converts hypophosphite to phosphate. This conversion coincides with an increase in turbidity of the culture and with phosphate accumulation in the medium. Investigations of omnithermophiles (organisms which grow over a broad temperature range i.e. 3-55 C) were also conducted. The cellular morphology of 28 of these isolates was investigated and all were demonstrated to be sporeformers. Biochemical characterizations are also presented. Procedures for replicate plating were evaluated and those results are also presented. The procedures for different replicate-plating techniques are presented and these are evaluated on the basis of reproducibility percentage of viable transfer and ease of use. Standardized procedures for the enumeration of microbial populations from ocean-dredge samples from Cape Canaveral are also presented. Author

**N76-20800\*# Douglas Aircraft Co Inc Long Beach Calif**  
**ANIMAL EXPOSURE DURING BURN TESTS Final Report**

James G Gaume Jan 1976 64 p refs

(Contract NAS2-8668)

(NASA-CR-137802 MDC-J7133) Avail NTIS HC \$4 50 CSCL 06C

An animal exposure test system has been designed and fabricated for the purpose of collecting physiological and environmental (temperature) data from animal subjects exposed to combustion gases in large scale fire tests. The AETS consists of an open wire mesh two-compartment cage one containing an exercise wheel for small rodents and the other containing one rat instrumented externally for electrocardiogram and respiration. The ECG and respiration sensors are located in a belt placed around the torso of the subject electrode wires forming an umbilical to a connector in the top of the compartment. A cable extends from the connector to the power supply and signal conditioning electronics. These are connected to a dual-beam oscilloscope for real time monitoring and a magnetic tape recorder having three or more channels. Endpoints observed are bradycardia cardiac arrhythmias changes in respiratory pattern respiratory arrest and cardiac arrest. The ECG record also appears to be a good method of monitoring animal activity as indicated by an

increase in EMG noise superimposed on the record during increased activity of the torso musculature. Examples of the recordings are presented and discussed as to their significance regarding toxicity of fire gases. Author

**N76-20801\*#** National Aeronautics and Space Administration Lewis Research Center Cleveland Ohio  
**NEURAL CODING OF HIGH-FREQUENCY TONES**  
 Walton L Howes Washington Mar 1976 9 p refs  
 (NASA-TM-X-3374 E-8607) Avail NTIS HC \$3 50 CSCL 05E

Available evidence was presented indicating that neural discharges in the auditory nerve display characteristic periodicities in response to any tonal stimulus including high-frequency stimuli and that this periodicity corresponds to the subjective pitch. Author

**N76-20802\*#** Missouri Univ Columbia  
**[STRESS, TEMPERATURE, HEART RATE, AND HIBERNATING FACTORS IN HAMSTERS] Annual Status Report**  
 X J Musacchia Aug 1974 109 p refs  
 (Grant NGL-26-004-021)  
 (NASA-CR-146665) Avail NTIS HC \$5 50 CSCL 06C

Pathophysiological conditions resulting from prolonged exposure to zero gravity cabin constraint altered ambient environment whether it be noise vibrations high temperatures or combinations of such factors are studied in laboratory animals and applied to manned space flight. Results and plans for further study are presented. Specific topics covered include thermoregulation and its role in reflecting stress and adaptation to the gravity free environment and cabin confinement with its altered circadian forcings renal function and its measurement in electrolyte distribution and blood flow dynamics gastrointestinal function and an assessment of altered absorptive capacity in the intestinal mucosa and catecholamine metabolism in terms of distribution and turnover rates in specific tissues. J M S

**N76-20803\*#** Missouri Univ Columbia  
**[HIBERNATION, STRESS, INTESTINAL FUNCTIONS, AND CATECHOLAMINE TURNOVER RATE IN HAMSTERS AND GERBILS] Annual Status Report**  
 X J Musacchia Aug 1973 25 p refs  
 (Grant NGL-26-004-021)  
 (NASA-CR-146662) Avail NTIS HC \$3 50 CSCL 06C

Bioenergetic studies on hamsters during depressed metabolic states are reported. External support of blood glucose extended the survival times of hibernating animals. Radioresistance increased in hibernating as well as in hypothermic hamsters. Marked changes in hamster catecholamine turnover rates were observed during acclimatization to high temperature stress. High radioresistance levels of the gerbil gastrointestinal system were attributed in part to the ability of the gut to maintain functional integrity. G G

**N76-20804#** Massachusetts Univ Amherst Dept of Chemical Engineering  
**THE DETERMINATION OF MASS TRANSFER LIMITATIONS IN AN IMMOBILIZED ENZYME PLUG FLOW REACTOR**  
 M S Thesis  
 Bruno J Rovito 7 Apr 1972 95 p refs Sponsored by NSF (PB-246123/4 NSF/RA/T-72-043) Avail NTIS HC \$5 00 CSCL 07D

Enzymes are protein molecules which are found in all living organisms and are natural catalysts. One would envision wide industrial use of enzymes to accomplish various reactions. In recent years a promising approach has been developed to circumvent some problems with enzymes. They have been immobilized whereby they are rendered water insoluble. Covalent bonding to a support appears most promising and was used in this research study. The advantages of immobilized enzymes over the soluble variety as well as the characteristics of enzymes in

general would indicate a bright future in commercial operations provided some preliminary work is carried out on laboratory equipment to further explore and continue to define the behavior of immobilized enzymes in flow reactors. The objective of the research was the evaluation and selection of alternative models for film and pore mass transfer applied to the use of immobilized enzymes in a plug flow reactor. GRA

**N76-20806\*#** Transemanatics Inc Washington D C  
**BODY TEMPERATURE FLUCTUATION AND HYPOTHALAMIC TEMPERATURE SENSIBILITY**  
 L P Dymnikova and K P Ivanov Washington NASA Mar 1976 15 p refs Transl into ENGLISH from Fiziol Zh SSSR (Moscow) v 55 no 3 1969 p 295-300  
 (Contract NASw-2792)  
 (NASA-TT-F-16978) Avail NTIS HC \$3 50 CSCL 06P

The reasons for the occurrence of body temperature fluctuations were studied. Body temperature in man and animals can change in various physiological states. These changes are explained by variations in heat production of a shift of the fixed point of the physiological heat regulator. Precise measurements of the temperature of the hypothalamus and several other areas of the brain arterial blood and skin were conducted in rabbits under chronic experimental conditions. Author

**N76-20807\*#** National Aeronautics and Space Administration Ames Research Center Moffett Field Calif  
**ADAPTATION TO PROLONGED BEDREST IN MAN A COMPENDIUM OF RESEARCH**  
 John E Greenleaf Carol J Greenleaf Dena VanDerVeer and Karen J Dorchak Washington Mar 1976 183 p refs  
 (NASA-TM-X-3307 A-6040) Avail NTIS HC \$7 50 CSCL 06S

A compilation of major studies that describe the clinical observations and elucidate the physiological mechanisms of the adaptive process of man undergoing prolonged bed rest is presented. Additional studies are included that provide background information in the form of reviews or summaries of the process. Wherever possible a detailed annotation is provided under the subheadings (1) purpose (2) procedure and methods (3) results and (4) conclusions. Additional references are provided in a selected bibliography. Author

**N76-20808\*#** Scientific Translation Service Santa Barbara Calif  
**THE DEVELOPMENT OF THE VESTIBULAR APPARATUS UNDER CONDITIONS OF WEIGHTLESSNESS**  
 Ya A Vinnikov O G Gazenko L K Titova A A Bronshteyn V I Govardovskiy R A Pevzner F G Gribakin M A Aronova T A Kharkeyevich and T P Tsurulis Washington NASA Apr 1976 11 p refs Transl into ENGLISH from Arkh Anat Gistol i Embriol (USSR) v 70 no 1 1976 p 11-16 Presented at COSPAR meeting Varna Bulgaria Jun 1975  
 (Contract NASw-2791)  
 (NASA-TT-F-16987) Avail NTIS HC \$3 50 CSCL 06P

The vestibular apparatus was studied in embryos of fishes and frogs in which the vestibular apparatus was still absent when they were launched into space. Electron microscope studies showed that the auditory vesicle with macula communis was indistinguishable from the controls. However development of the otoliths and otolithic membranes showed significant deviations under weightlessness conditions. Author

**N76-20809#** Oak Ridge National Lab Tenn  
**RADIATION MONITORING, AUGUST 1975 Annual Report, 1974**  
 Aug 1975 69 p Sponsored by ERDA  
 (ORNL-5055) Avail NTIS

There were no external or internal exposures to personnel of ORNL which exceeded the standards for radiation protection as defined in ERDA Manual Chapter 0524. Only 41 employees received exposures greater than 1 rem. The highest whole body exposure dose equivalent to an employee was 3.58 rem. The highest internal exposure was less than one half of the maximum.

permissible body burden During 1974 20 portable instruments were added to the inventory and nine retired The total number in service on January 1 1975 was 1 294 There were 22 facility radiation monitoring instruments installed and 21 retired during 1974 The total number in service on January 1 1975 was 983  
Author (NSA)

**N76-20810#** Massachusetts General Hospital Boston  
**SORPTION AND RETENTION OF SUBSTANCES IN THE SURFACE LAYERS OF THE SKIN** Final Technical Report, Jan 1972 - Nov 1974

Robert J Scheuplein Feb 1975 129 p refs

(Contract DAHC19-72-G-0014)

(AD-A009792 ARO-11706 1-L) Avail NTIS CSCL 06/16

The sorption and desorption behavior of various compounds into and out of human skin was studied using an in vitro techniques Aqueous solutions of radio actively tagged electrolytes were applied to the surface of intact specimens of epidermis and the sorption and desorption of these solutes by the stratum corneum was measured Analysis of the equilibrium sorption data gave diffusion constants values of partition coefficients and thermodynamic quantities e.g enthalpies of sorption Water alcohols glycols phenols esters and assorted other nonelectrolytes were studied The sorption of water was found to have a large effect on the structure of the stratum corneum leading to increased sorption capacity and greater diffusivity of the tissue for other subsequently applied substances  
GRA

**N76-20811#** Colorado State Univ Fort Collins  
**TRANSMURAL QUANTITATIVE MEASUREMENT OF BLOOD FLOW** Final Report

Michael B Hstand and Charles W Miller Jun 1975 39 p refs

(Grant NSF GK-41227)

(PB-246822/1 NSF-31-1374-3074) Avail NTIS HC \$4 00 CSCL 06P

A pulsed ultrasound Doppler velocity meter was evaluated for quantitative transmural and transcutaneous measurement of blood flow Experiments were performed for highly controlled flow conditions in long straight segments of dialysis tubing and in vivo in canines The authors were able to clearly demonstrate the high degree of accuracy of the PUDVM for measuring flow and velocity when the transducer and electronic gate were less than half the vessel radius Also the high correlation between transcutaneous measurements of blood velocity and values obtained with cuffs implanted directly on the vessel was shown  
GRA

**N76-20812#** Bureau of Radiological Health Rockville Md  
**MEDICAL X-RAY PHOTO-OPTICAL SYSTEMS EVACUATION SYMPOSIUM**

David J Goodenough and Robert F Wagner Oct 1975 256 p refs Symp held at Columbia Md 21 23 Oct 1974

(Contract FDA-223-74-6119)

(PB-246946/8 DHEW/FDA-76 8020) Avail NTIS HC \$9 00 CSCL 06L

Quality control procedures are developed to assure optimal and reproducible application of the best technology The meeting of experts from diverse circumstances - radiologists medical physicists members of standards institutes scientists industry U S and foreign associations researchers and other responsible scientists met to improve the diagnostic quality of images formed from medical X-rays Lowering the X-ray dose requirements and discovering ways to make the best and safest technology available to the consumer community were discussed  
GRA

**N76-20813#** Air Force Systems Command Wright-Patterson AFB Ohio Foreign Technology Div

**WEIGHTLESS ORBIT**

Boris Kononov 6 May 1975 12 p refs Transl into ENGLISH from Izvestiya (USSR) no 34/17877 9 Feb 1975 p 3

(AD-A017199 FTD-ID(RS)1325-75) Avail NTIS CSCL 06/19

The monitoring of the flight of Salyut-4 is reported The spaceship includes a multipurpose laboratory which studies

astrophysics the universe the earth's surface its natural resources and biological and medical experiments  
GRA

**N76-20814#** Duke Univ Durham N C Dept of Ophthalmology  
**LASER EXPOSURES IN THE MACULAS OF HUMAN VOLUNTEERS** Final Report

M L Wolbarsht and M B Landers III 30 Sep 1975 46 p refs

(Contract N00014-67-A-0251-0011)

(AD-A017507) Avail NTIS CSCL 06/18

Patients whose eyes require enucleation for medical reasons were exposed to focused argon laser beams in a regular pattern of locations in the eye especially in the macula including the fovea The power levels were suprathreshold to just produce instantaneous lesions The ophthalmoscopic appearance of the resultant lesions was correlated with loss of function and with subsequent histological examination An argon laser lesion in the macula may have greater functional impairment than a comparable ruby laser lesion In lesions outside the macula the damage is confined to the retinal pigment epithelium and adjacent structures In markedly suprathreshold lesions the outer segments of the rods were less disturbed than the inner nuclear and plexiform layers Within the macula there are usually two damage locations separated by unchanged layers of the retina In the pigment epithelium in which the damage was the same or less than in lesions outside the macula there was a larger area of damage in the outer plexiform layer Foveal lesions had greater damage to the fiber layer of Henle (outer plexiform layer) than in adjacent areas of the macula at comparable power levels  
GRA

**N76-20815#** Lovelace Foundation for Medical Education and Research Albuquerque NMex

**DOSE-RATE EFFECTS OF Co60 IRRADIATION**

A Bruner V Bogo and E A Henderson 30 Jul 1975 84 p refs

(Contracts DASA01-70-C-0059 DNA001-74-C-0098 DNA

Proj NWED-QAXMA191)

(AD A017505 DNA-3660T) Avail NTIS CSCL 06/18

One thousand rad Co60 was administered to 12 monkeys at 75 rad/min and to 8 monkeys at 50 rad/min while they performed a delayed match-to-sample shock avoidance task Only four at 75 rad/min and two at 50 rad/min showed early performance decrement and/or early transient incapacitation (PD ETI) in contrast to 13 of 16 previously studied monkeys who showed PD-ETI with an average dose rate of 180 rad/min A dose-rate effect was concluded When these three groups were compared with an untrained group exposed to a 4000-rad gamma-neutron pulse all showed similar degrees of hypotension postirradiation But the onset of hypotension was delayed and its rate of fall prolonged as dose rate decreased Tentative interpretation was that radiation thresholds for the induction of PD-ETI exist for cumulative dose (> or - 300 rad midbody) and dose rate ( or 30 rad/min)  
GRA

**N76-20816#** Office of Naval Research London (England)

**CURRENT RESEARCH ON NATURAL MEMBRANES** Report for period ending Aug 1975

Martin Blank 11 Sep 1975 23 p

(AD-A017548 ONRL-15-75) Avail NTIS CSCL 06/16

In recent years there have been important advances in understanding of the structure and functions of natural membranes This report summarizes and assesses the general state of research on the subject with the emphasis on developments in Europe The author's perspective which was formed during the past year as a result of visiting labs and talking to scientists includes a recognition of the role of various paradigms in membrane research and a change in the conception of molecular movements in membranes as a result of the introduction of fluidity measurements The report summarizes these ideas and provides a general overview of recent specific research developments in Europe  
GRA

**N76-20817\*#** AiResearch Mfg Co Los Angeles Calif  
**OBJECTIVE TECHNIQUES FOR PSYCHOLOGICAL ASSESSMENT, PHASE 2 Final Report**  
 E C Wortz A J Saur D P Nowlis and M P Kendall 30 Aug 1974 199 p refs  
 (Contract NAS9-12771)  
 (NASA-CR-147512 AiResearch-74-10681) Avail NTIS HC \$7 50 CSCL 05J

Results are presented of an initial experiment in a research program designed to develop objective techniques for psychological assessment of individuals and groups participating in long-duration space flights. Specifically examined is the rationale for utilizing measures of attention as an objective assessment technique. Subjects participating in the experiment performed various tasks (eg playing matrix games which appeared on a display screen along with auditory stimuli). The psychophysiological reactions of the subjects were measured and are given. Previous research of various performance and psychophysiological methods of measuring attention is also discussed. The experiment design (independent and dependent variables) and apparatus (computers and display devices) are described and shown. Conclusions and recommendations are presented. Author

**N76-20818#** Aerospace Medical Research Labs Wright-Patterson AFB Ohio  
**QUANTIFICATION AND PREDICTION OF HUMAN PERFORMANCE SEQUENTIAL TASK PERFORMANCE RELIABILITY AND TIME Final Report**  
 Robert G Mills Robert F Bachert and Shirley A Hatfield Aug 1975 37 p refs  
 (AF Proj 7184)  
 (AD-A017333 AMRL-TR-74-48) Avail NTIS CSCL 05/10

A methodology has been developed and an experiment conducted to examine some of the assumptions and combinatorial rules employed in applying human performance reliability (HPR) and task time data to the quantification of human performance. Subjects performed a variety of tasks designed to provide empirical estimates of HPR and task time and to permit examination of the effects of combining tasks. Results indicated (a) the normality assumption for distribution of task time is inappropriate (b) the rules for combining task times are satisfactory if the underlying distribution of task times is known (c) HPR is affected severely by combining tasks and (d) any model for estimating HPR will require parameters to account for task combining and difficulty. GRA

**N76-20819#** Life Sciences Inc Hurst Tex  
**AFHRL/FT CAPABILITIES IN UNDERGRADUATE PILOT TRAINING SIMULATION RESEARCH EXECUTIVE SUMMARY Final Report, Aug 1974 - Mar 1975**  
 W G Matheny T H Gray and B K Waters Aug 1975 33 p refs  
 (Contract F41609-73-C-0038 AF Proj 1123)  
 (AD-A017168 LSI-TR-74-2 AFHRL-TR-75-26(1)  
 AFHRL-TR-75-26(2)) Avail NTIS CSCL 05/9

This report describes (1) The research capabilities of AFHRL/FT with particular emphasis upon the advanced simulator for undergraduate pilot training (ASUPT) (2) Results of a prioritization of potential flying research issues by a panel of experts (3) Contractor recommendations for initial AFHRL/FT experimental investigations and (4) the AFHRL/FT facility utilization program for calendar year 1975. The concept of performance equivalence between simulator and aircraft is presented along with a description of suggested studies designed to validate the concept. Utilization of automated performance measures on both system outputs and pilot control inputs forms an essential element of the model. GRA

**N76-20820#** Naval Postgraduate School Monterey Calif  
**AN ANALYSIS OF AGE AND PERFORMANCE AMONG COMMUNICATIONS PERSONNEL M S Thesis**  
 James M Carter Sep 1975 60 p refs  
 (AD-A017536) Avail NTIS CSCL 05/10

This thesis utilized longitudinal and performance appraisal information on 182 naval telecommunications personnel from

two Naval Communication Stations and an Attack Carrier to develop a career development model and high performance characteristics. High correlation between age and paygrade mean time between advancements and years since last advancement and weak correlation between age and job index and evaluation scores were noted. When scored on an all or nothing basis the 31-36 year age-group received a significantly higher mean score on the evaluation questionnaire than the 37-42 year age-group. This may be interpreted as early low performance among the personnel sampled for this study. Author (GRA)

**N76-20821#** Naval Postgraduate School Monterey Calif  
**HUMAN PERFORMANCE OF BIORHYTHMS M S Thesis**  
 William Wilson Cobb Jr Sep 1975 42 p refs  
 (AD-A017537) Avail NTIS CSCL 05/10

Using a serial memory task human performance and biorhythms were studied in the laboratory for a fifteen week period. The purpose of the experiment was to determine whether dependency between human performance and biorhythmic cycles existed for the subjects observed. Analysis of the data using the Chi-Square Contingency Test collected from 4 subjects showed a significant dependency at the .05 level existed between 2 of 3 biorhythmic cycles and human performance as well as near significant dependency existing for the third cycle and human performance. Further analysis using the X squared one sample test showed no significance between critical days and categories of performance at the .05 level. Author (GRA)

**N76-20822#** Stanford Research Inst Menlo Park Calif  
**FEASIBILITY STUDY FOR DESIGN OF A BIOCYBERNETIC COMMUNICATION SYSTEM Final Technical Report**  
 Lawrence R Pinneo Patricia Johnson Jennine Herron and Charles S Robert Aug 1975 157 p refs  
 (Contract DAH15-72-C-0167 ARPA Order 2034 SRI  
 SRI Proj LSU-1936)  
 (AD-A017405) Avail NTIS CSCL 05/8

The purpose of this three-year research program was to test the feasibility of designing a close-coupled two-way communication link between man and computer using biological information from muscles of the vocal apparatus and the electrical activity of the brain during overt and covert (verbal thinking) speech. The research plan was predicated on existing evidence that verbal ideas or thoughts are subvocally represented in the muscles of the vocal apparatus. If the patterns of this muscle activity are at all similar to those involved in normal overt speech a reasonable assumption is that the electrical activity of the brain during verbal thinking may be similar to that during overt speech. The results are reported in two parts. Part I concerns the off-line and on line analysis of the EEG coincident with overt and covert speech as it might be used in biocybernetic communication and Part II concerns the hemispheric laterality difference. GRA

**N76-20823\*#** Stanford Univ Calif  
**BIOCYBERNETIC FACTORS IN HUMAN PERCEPTION AND MEMORY Final Report**  
 David C Lai Sep 1975 112 p refs  
 (Grant NGR-05-020-575 Contract DAH15-72-C-0232)  
 (NASA-CR-146557 AD-A017374 SU-SEL-75 021) Avail NTIS HC \$5 50 CSCL 06/2

The objective of this research is to develop biocybernetic techniques for use in the analysis and development of skills required for the enhancement of concrete images of the eidetic type. The scan patterns of the eye during inspection of scenes are treated as indicators of the brain's strategy for the intake of visual information. The authors determine the features that differentiate visual scan patterns associated with superior imagery from scan patterns associated with inferior imagery and simultaneously differentiate the EEG features correlated with superior imagery from those correlated with inferior imagery. A closely-coupled man-machine system has been designed to generate image enhancement and to train the individual to exert greater voluntary control over his own imagery. The models for EEG signals and saccadic eye movement in the man machine system have been completed. The report describes the details of these models and discusses their usefulness. GRA

**N76-20824\*#** National Aeronautics and Space Administration Langley Research Center Langley Station Va  
**AN INVESTIGATION OF CORRELATION BETWEEN PILOT SCANNING BEHAVIOR AND WORKLOAD USING STEPWISE REGRESSION ANALYSIS**  
 Marvin C Waller Washington Mar 1976 22 p refs  
 (NASA-TM-X-3344 L-10566) Avail NTIS HC \$3 50 CSCL 05E

An electro-optical device called an oculometer which tracks a subject's viewpoint as a time function has been used to collect data in a real-time simulation study of instrument landing system (ILS) approaches. The data describing the scanning behavior of a pilot during the instrument approaches have been analyzed by use of a stepwise regression analysis technique. A statistically significant correlation between pilot workload as indicated by pilot ratings and scanning behavior has been established. In addition, it was demonstrated that parameters derived from the scanning behavior data can be combined in a mathematical equation to provide a good representation of pilot workload.

Author

**N76-20825\*#** Rockwell International Corp Los Angeles Calif Aircraft Div  
**RIDE QUALITIES CRITERIA VALIDATION/PILOT PERFORMANCE STUDY FLIGHT SIMULATOR RESULTS Final Report**  
 Louis U Nardi Harry Y Kawana Christopher J Borland and Norman M Lefritz Mar 1976 101 p refs  
 (Contract NAS4-2236)  
 (NASA-CR-143838 H-936) Avail NTIS HC \$5 50 CSCL 05E

Pilot performance was studied during simulated manual terrain following flight for ride quality criteria validation. An existing B-1 simulation program provided the data for these investigations. The B-1 simulation program included terrain following flights under varying controlled conditions of turbulence, terrain mission length, and system dynamics. The flight simulator consisted of a moving base cockpit which reproduced motions due to turbulence and control inputs. The B-1 aircraft dynamics were programmed with six-degrees-of-freedom equations of motion with three symmetric and two antisymmetric structural degrees of freedom. The results provided preliminary validation of existing ride quality criteria and identified several ride quality/handling quality parameters which may be of value in future ride quality/criteria development.

Author

**N76-20826#** School of Aerospace Medicine Brooks AFB Tex  
**THE C-141 THERAPEUTIC OXYGEN MANIFOLD DISTRIBUTION SYSTEM Final Report, Sep 1972 - Jul 1974**  
 Paul C Baker Aug 1975 7 p  
 (AF Proj 7996)  
 (AD-A015740 SAM-TR-75-31) Avail NTIS CSCL 06/11

The C-141 Therapeutic Oxygen Manifold System was developed to overcome deficiencies of the integral C-141 therapeutic oxygen system. Three functional units fabricated in-house to meet design specifications and performance requirements successfully passed all phases of DT and E. No changes were made to the hardware. Two units were made available to Military Airlift Command for Operational Test and Evaluation (OT/E). OT/E results indicated that the units were acceptable for routine use aboard C-141 aeromedical airlift missions and were a definite improvement over the integral therapeutic oxygen system.

Author (GRA)

**N76-20827#** National Bureau of Standards Washington D C Center for Fire Research  
**DESIGN CRITERIA FOR FIREFIGHTERS' TURNOUT COATS Final Report**  
 J W Eisele Oct 1975 38 p Sponsored in part by Natl Fire Prevention and Control Admin  
 (COM-75-11433/0 NBSIR-75-702) Avail NTIS HC \$4 00 CSCL 06Q

The design criteria cover requirements for the sizing, construction, outer shell, inner linings, weight, and thickness for firefighters' turnout coats, as well as test methods, labeling requirements, and design considerations. Included also is a list

of options and other items of concern to potential users of the criteria and a sample purchase specification to be used in conjunction with the criteria.

GRA

**N76-20828#** Army Aeromedical Research Lab Fort Rucker Ala  
**THE USE OF OPAQUE LOUVRES AND SHIELDS TO REDUCE REFLECTIONS WITHIN THE COCKPIT A TRIGONOMETRICAL AND PLANE GEOMETRICAL APPROACH Final Report**

Chun K Park and Frank F Holly Sep 1975 23 p refs  
 (AD-A017366 USAARL-76-4) Avail NTIS CSCL 05/5

Opaque shields can be used to channel light and thereby reduce reflections within the cockpit. These shielding devices range from the standard glare shield on top of the instrument panel to the more experimental use of Light Control Film and Micromesh for this purpose. Because of the need to determine the best position, width, spacing, etc. of these shielding devices, it was felt that a systematic approach would be highly desirable. This work describes a mathematical analysis to assess the applicability of those devices to resolve aircraft windscreen reflection problems.

GRA

**N76-20829#** Fabric Research Labs Inc Dedham Mass  
**EXPLORATORY DEVELOPMENT OF COATED FABRIC FOR FIREFIGHTERS' PROTECTIVE CLOTHING Final Report, 1 Apr 1974 - 31 Mar 1975**

Norman J Abbott T E Lannefeld and R E Erlandson Jul 1975 21 p

(Contract F33615 74-C-5117 AF Proj 7320)  
 (AD-A016525 AFML-TR-75-72) Avail NTIS CSCL 11/5

The objective of the work was to improve the durability of the aluminized fabric currently used for the outer layer of firefighters' proximity coats. Two possible improvements were developed: (a) Substituting a Viton/bronze coating for the aluminum and adding a topcoat of pigmented urethane to improve wear resistance; (b) Adding a topcoat of pigmented urethane to the aluminized fabric to improve wear resistance. Sample lengths of both types of coated fabric were produced.

GRA

**N76-20830#** Human Factors Research Inc Goleta Calif  
**TOWARD A METHODOLOGY FOR MAN-MACHINE FUNCTION ALLOCATION IN THE AUTOMATION OF SURVEILLANCE SYSTEMS VOLUME 1 SUMMARY Final Technical Report, 8 Mar 1971 - 12 Dec 1974**

C Sylie Robert A Dick and Robert R Mackie 31 Jul 1975 85 p refs

(Contract N00014-71-C-0301 DARPA Order 1751)  
 (AD-A017103 TR-1722-F-Vol-1) Avail NTIS CSCL 05/8

A study was conducted to determine some of the performance implications of various degrees of automation in surveillance systems. The objective was to aid system designers of future surveillance systems in making trade-off decisions. A general functional taxonomy of surveillance systems was developed and each function was considered in terms of the necessity of operator involvement versus the likely success of full automation. A model of human information processing in surveillance systems was developed and various strengths and weaknesses of surveillance system operators were discussed in relation to the elements of the model.

GRA

**N76-20831#** Underwriters Labs Inc Tampa Fla  
**INVESTIGATION OF THE PERFORMANCE OF PERSONAL FLotation DEVICES Final Report**

Aug 1975 129 p refs  
 (Contract DOT-CG-25112-A)  
 (AD-A017101 USCG-D-168-75) Avail NTIS CSCL 06/7

An experimental investigation was performed to study various aspects of an existing theory for flotation equilibrium angle of a person wearing a personal flotation device (PFD) in water. The major objectives were determination of the validity of the theory and derivation of a method for determining the buoyant force and center of buoyancy of a PFD when worn by a person. Additionally, information was obtained on the sensitivity of the theory to small changes in variables, the variability of repetitive measurements of certain human-body characteristics required by

the theory (namely lung vector and intrinsic stiffness vector) the variation with time of day of an individual's intrinsic stiffness vector and the comparative effectiveness of five PFDs. The experiments used eight human subjects (130-240 lbs in weight) five PFDs and five different times of day. Because of the small number of experiments used the statistical significance of some results is limited. A recommended approach to evaluating PFD effectiveness using experiments with mannequins is described.

GRA

**N76-21869\*#** Food and Drug Administration Cincinnati Ohio  
**ECOLOGICAL AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS** Quarterly Progress Report, 1 Oct - 31 Dec 1975  
 A L Reyes and J E Campbell Mar 1976 27 p refs  
 (NASA Order W-13411)  
 (NASA-CR-146549 QPR-43) Avail NTIS HC \$4.00 CSCL 06M

The heat resistance of *Bacillus subtilis* var. *niger* was measured from 85 to 125 C using moisture levels of % RH < or = 0.001 to 100. Curves are presented which characterize thermal destruction using thermal death times defined as F values at a given combination of three moisture and temperature conditions. The times required at 100 C for reductions of 99.99% of the initial population were estimated for the three moisture conditions. The linear model (from which estimates of D are obtained) was satisfactory for estimating thermal death times (% RH < or = 0.07) in the plate count range. Estimates based on observed thermal death times and D values for % RH = 100 diverged so that D values generally gave a more conservative estimate over the temperature range 90 to 125 C. Estimates of Z sub F and Z sub L ranged from 32.1 to 58.3 C for % RH of < or = 0.07 and 100. A Z sub D = 30.0 was obtained for data observed at % RH < or = 0.07.

Author

**N76-21870\*#** Kanner (Leo) Associates Redwood City Calif  
**THE GERMICIDAL EFFECTIVENESS OF ETHYLENE OXIDE/CARBON DIOXIDE AS COMPARED WITH STEAM**  
 F Dosch Washington NASA Apr 1976 6 p refs Transl into ENGLISH from Zentr Bakteriell Parasitenk Erste Abt Orig (Jena) no 184 1962 p 201-203  
 (Contract NASw-2790)  
 (NASA-TT-F-17006) Avail NTIS HC \$3.50 CSCL 06M

A mixture of 15% ethylene oxide and 85% carbon dioxide at 55 C proved to be just as effective as steam at 133 C in killing microorganisms with the most resistant native spores surviving no longer than 30 minutes.

Author

**N76-21871\*#** Joint Publications Research Service Arlington Va  
**SURPRISES OF SPACE BIOLOGY**  
 B Gerasimov Washington NASA Apr 1976 5 p Transl into ENGLISH from Sots Industriya (USSR) no 32 8 Feb 1976 p 4  
 (NASA Order W-13183)  
 (NASA-TT-F-16985) Avail NTIS HC \$3.50 CSCL 06B

Various organisms which were aboard the landing biosatellite Cosmos-782 were studied upon their return to earth. One of the main tasks of this mission was to determine the pure effect of weightlessness on live organisms. Because 6-7 hours after the landing the organisms begin to be subjected to the effect of g-loads vibration and change in temperature it is important to study them at once after their arrival. Then they are taken to Moscow for additional study. Artificial gravity was created aboard Cosmos-782. Plants which were in an onboard centrifuge (which created the gravity force) developed better than those subjected to weightlessness. For the first time guppies gave birth in space.

Author

**N76-21872#** Army Mobility Equipment Research and Development Center Fort Belvoir Va  
**USE OF REVERSE OSMOSIS AND ULTRAFILTRATION FOR REMOVING MICROORGANISMS FROM WATER** Report for Nov 1971 - Oct 1972  
 Johann A Hinterberger Don C Lindsten and Allen Ford Sep 1974 66 p refs  
 (DA Proj 1G7-62708-DJ-39)  
 (AD-A008331 USAMERDC-2111) Avail NTIS CSCL 13/2

The report covers the investigation of the capability of reverse osmosis and ultrafiltration membrane water purification systems in removal of bacteria from water. Results of the study indicate that reverse osmosis and ultrafiltration membranes are highly effective in removal of bacteria from water. Performance operating procedures and design are discussed.

GRA

**N76-21875\*#** Kanner (Leo) Associates Redwood City Calif  
**THE ORGANIZATION OF VOLUNTARY MOVEMENT NEUROPHYSIOLOGICAL MECHANISMS**  
 Ya M Kotz Washington NASA Mar 1976 252 p refs Transl into ENGLISH of the mono Organizatsiya Proizvolnogo Dvizheniya Neyrofiziologicheskoye Mekhanizmy Moscow Nauka Press 1975 p 1-248  
 (Contract NASw-2790)  
 (NASA-TT-F-16871) Avail NTIS HC \$9.00 CSCL 06P

Data from the world's literature on the neurophysiological mechanisms of the organization of voluntary movement in man and the higher animals are correlated in a text (book). Experimental methods are described which were developed for studying the spinal neuronal mechanisms of the organization of voluntary movement and the descending supraspinal control of the segmental motor apparatus in man. The dynamics of complex changes in the state of different neuronal systems of the brain and spinal cord which precede and determine the performance of a voluntary movement are characterized. The role of various supraspinal descending systems in the organization and realization of voluntary movement is analyzed. The textbook is intended for use by physiologists psychophysicists, physicians cyberneticists industrial and sports physiologists, and specialists in aerospace medicine.

Author

**N76-21876\*#** Kanner (Leo) Associates Redwood City Calif  
**STATISTICAL ANALYSIS OF CARDIAC RHYTHM BY MEANS OF HIGHER-ORDER MOMENTS**  
 G I Sidorenko G K Afanasyev and Ya G Nikitin Washington NASA Apr 1976 10 p refs Transl into ENGLISH from Kardiologiya v 15 no 12 Dec 1975 p 96-99  
 (Contract NASw-2790)  
 (NASA-TT-F-16995) Avail NTIS HC \$3.50 CSCL 06P

A Minsk-22 computer was used for statistical analysis of the rhythm of cardiac contractions. A specialized device -- the intervalmeter -- was developed to measure automatically the intervals between the R spikes of an electrocardiogram and to punch them onto tape for computer input. Analysis of cardiac rhythm consisted in calculating the statistical moments of the first second third and fourth order -- the mathematical expectation dispersion, excess and asymmetry in the distribution of R-R intervals in an electrocardiogram. It was found that the use of a statistical moment of the third order -- the index of asymmetry of R-R intervals -- reveals the dynamics of transient processes better than an intervalgram. The mathematical moment of the fourth order -- the excess index -- provides an opportunity to evaluate in a condensed form the rhythm stability and specifics of its regulation. The use of these methods of cardiac rhythm analysis is expedient for various functional tests and the assessment of pharmacological effects.

Author

**N76-21877#** Research Inst of National Defence Stockholm (Sweden)  
**EMP EFFECTS ON MANKIND**  
 M Wik Apr 1975 12 p Transl into ENGLISH from Swedish Report  
 (AWRE-Trans-67) Avail ERDA Depository Libraries HC \$4.00

The effects of electromagnetic pulses (EMP) on humans are very much a problem of secondary importance in the context of nuclear explosions. This report is intended to present a basis for the evaluation of EMP effects on man in those cases where such effects can at all be contemplated. The report deals with conceivable causes of the effects electric shock and protection against the effects of EMP on man.

Author (NSA)

**N76-21878#** Commission of the European Communities Luxembourg  
**RADIOLOGICAL PROTECTION 3 TECHNICAL RECOM-**

**MENDATIONS FOR THE USE OF THERMOLUMINESCENCE FOR DOSIMETRY IN INDIVIDUAL MONITORING FOR PHOTONS AND ELECTRONS FROM EXTERNAL SOURCES**

1975 52 p refs

(EUR-5358e) Avail ERDA Depository Libraries HC \$5 75

The advantages of thermoluminescence dosimetry for monitoring personnel for radiation dosages are discussed. The properties of thermoluminescent detectors and sources of possible errors in thermoluminescent dosimetry are reviewed (NSA)

**N76-21879# Australian Atomic Energy Commission Coogee EFFECTS OF IONIZING RADIATION ON MAN**

G M Watson Aug 1975 27 p refs

(AAEC/IP-1) Avail ERDA Depository Libraries HC \$4 50

Major effects of ionizing radiation on man and the relationship between such effects and radiation dose were studied. It was concluded that standards of radiological safety must be based on the carcinogenetic and mutagenic properties of ionizing radiation. Exposure from man-made sources of radiation should be regulated but since there is little observational or experimental evidence for predicting the effects of the very small doses likely to be required for adequate standards of safety it is necessary to infer them from what is seen at high doses. Two assumptions are conventionally used that there is a linear relationship between dose and effect at all levels of dose and that the rate at which a dose of radiation is given does not alter the magnitude of the effect. These assumptions are thought to be conservative that is they will not lead to an underestimation of the effects of small radiation doses although they may give an overestimate.

Author (NSA)

**N76-21880# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt Porz (West Germany) EVALUATION OF FLIGHT FITNESS IN LATENT DIABETES EFFECTS AND QUALITATIVE DETERMINATION OF ORAL ANTIDIABETIC DRUGS [ZUR BEURTEILUNG DER FLIEGERTAUGLICHKEIT BEI LATENTEM DIABETES WIRKUNGSWEISE UND QUALITATIVER NACHWEIS DER ORALEN ANTIDIABETICA]**

G Schaefer [1973] 16 p In GERMAN

(DLR-IB-355-73/2) Avail NTIS HC \$3 50

Subclinical diabetic patients under oral antidiabetic treatment should not be recruited nor be retained in flight crews as flight stress could precipitate unpredictable hypoglycemic crises as a drug side effect. Effects of antidiabetic sulfamides and biguanides are discussed. Excretion routes, serum and urine detection are reviewed. ESA

**N76-21881# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt Bad Godesberg (West Germany) Inst fuer Flugmedizin**

**CARDIAC PACEMAKERS IN AIR TRANSPORTATION [HERZSCHRITTMACHER IM FLUGVERKEHR]**

H Hohlweck [1974] 7 p In GERMAN

(DLR-IB-004-72/4) Avail NTIS HC \$3 50

Two kinds of cardiac pacemakers acting on demand and permanently regulating the heart contraction were tested for disturbances from onboard electronics as well as disturbing onboard electronics in suitable test conditions. Passengers wearing a pacemaker should not walk through a high frequency weapon control instrumentation. ESA

**N76-21882# Life Sciences Inc Hurst Tex TEST OF A MODEL OF VISUAL SPATIAL DISCRIMINATION AND ITS APPLICATION TO HELICOPTER CONTROL Final Report, 1 Jun 1972 - 31 May 1975**

N A Crowder, J A Bynum and W G Matheny Jun 1975 55 p refs

(Contract DADA17-72-C-2110)

(AD-A018080 LSI-TR-75-2) Avail NTIS CSCL 06/16

A series of 4 laboratory studies and 3 field studies using a helicopter in hovering flight were undertaken to validate and test the assumptions made in and the predictions made from the Thielges-Matheny Analysis of Visual Discrimination in Helicopter Control. The results of the field studies generally were in accordance with the predictions made from the model. In

particular, certain results suggest that improved hover accuracy is obtained when the pilot is required or otherwise induced to use an eye-line-of-regard depressed substantially below his customary visual scan pattern. The laboratory studies were concerned primarily with validating the assumptions made in the Thielges-Matheny model concerning visual discrimination of changes in angular separation or relationship of two points in the visual field. The results of the laboratory studies show that the simple Weber ratio is not an adequate index of discriminability of displacement of one point with respect to the other. One of the results that detection of motion across the imaginary line separating the two points is at least as easy as detection of displacement along that line allows a considerable simplification of the model without changing its more important predictions. The most striking finding of the laboratory studies is the appearance of an Angular shrinkage illusion which causes the angular separation of two points to be recalled as less than it actually was. GRA

**N76-21883# Naval Aerospace Medical Research Lab Pensacola Fla**

**PULMONARY FUNCTION TESTING IN MILITARY PERSONNEL A PRELIMINARY STUDY**

Robert Bason and David R Stoop May 1975 17 p refs

(MF51524005)

(AD-A018067 NAMRL-1217) Avail NTIS CSCL 06/16

The military community is made up of a very diverse group of individuals representing a random sample from all walks of life and geographical locations. Although these individuals are supposedly healthy, an increasing number of them are later being diagnosed as having obstructive ventilatory mechanics. This study is concerned with the pulmonary function results of a supposedly healthy population of Naval Aviation Officer Candidates and designated Naval Aviators at Naval Air Station Pensacola, Florida. The data suggest a high incidence of obstructive ventilatory mechanics in a relatively young age group (20-24 years old). Whereas most studies such as this reflect disease statistics in patients already symptomatic, this current investigation reveals a significant percentage (23.5%) of the as yet asymptomatic young age group who have the beginnings of a long-term process. Author (GRA)

**N76-21884# Navy Experimental Diving Unit Panama City Fla NITROUS OXIDE AND TREMOR Final Report**

R C Carter, M K Mewha and L E Lash 30 Sep 1975 24 p refs

(AD-A017748 NEDU-10-75) Avail NTIS CSCL 06/20

Standing steadiness and postural tremor were measured for seven subjects while breathing nitrous oxide. Concentrations of nitrous oxide were twelve, eighteen, twenty-nine and thirty-four percent. Measurements were also made while subjects breathed pure oxygen and air. Nitrous oxide affected neither frequency spectrum nor magnitude of postural tremor. Standing unsteadiness increased exponentially with nitrous oxide dosage. Subjects tended to correct their balance more often as the concentration of nitrous oxide was increased. Approximate equivalent dosages of hyperbaric air and nitrous oxide are shown. GRA

**N76-21885# Naval Medical Field Research Lab, Camp Lejeune NC**

**PREDICTING THE RECTAL TEMPERATURE RESPONSE TO HEAT STRESS Medical Research Progress Report**

Garold K Osborn Oct 1975 19 p refs

(MF51524023)

(AD-A016451 NMFRL-Vol-XXV-No-11 PR-1) Avail NTIS CSCL 06/19

The accuracy of Givoni-Goldman's equations and of the power function equation  $Y = a(X \sup b)$  for the prediction of rectal temperature was determined for a sample of Marine troops undergoing different levels of heat strain. The equations of Givoni-Goldman developed to be applied to heat-acclimatized men were more accurate in their prediction when the observed values of rectal temperature were above rather than below 38.5°C. The effect of heat conditioning was to increase the difference between predicted and observed values so that the latter tended

to be overestimated. When the rectal temperature-time response curve was projected by means of the power function equation to later time points from values measured at three time points early in the exposure, the projected values tended to be lower than observed values for subjects experiencing higher degrees of heat strain. While more than 50% of the differences between observed and projected values were less than 0.5°C, yet such individual differences could be as large as 1°C. GRA

**N76-21886\*#** National Aeronautics and Space Administration  
Langley Research Center Langley Station Va  
**PASSENGER RIDE QUALITY WITHIN A NOISE AND VIBRATION ENVIRONMENT**

Thomas K Dempsey Jack D Leatherwood and Arlene B Drezek (Northrop Services) Apr 1976 25 p refs  
(NASA-TM-X-72841) Avail NTIS HC \$3.50 CSCL 05E

The subjective response to noise and vibration stimuli was studied in a ride quality simulator to determine their importance in the prediction of passenger ride quality. Subjects used category scales to rate noise discomfort, vibration discomfort, both noise and vibration discomfort and overall discomfort in an effort to evaluate parametric arrangements of noise and vibration. The noise stimuli were composed of octave frequency bands centered at 125, 250, 2000 and 4000 Hz, each presented at 70, 75, 80, and 85 dB(A). The vertical vibration stimuli were 5 Hz bandwidth random vibrations centered at 3, 5, 7, and 9 Hz, each presented at 0.03, 0.06, 0.09, and 0.12 grms. Analyses were directed at (1) a determination of the subjects' ability to separate noise and vibration as contributors to discomfort, (2) an assessment of the physical characteristics of noise and vibration that are needed for prediction of ride quality in this type of multifactor environment, and (3) an evaluation of the relative contribution of noise and vibration to passenger ride quality. Author

**N76-21887#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hamburg (West Germany) Inst fuer Flugmedizin

**MINIMUM FLIGHT CREW OF TRANSPORT AIRCRAFT METHODS FOR MEASURING WORKLOAD OF FLIGHT CREWS**

K Steininger and C Wistuba [1974] 49 p refs. In GERMAN ENGLISH summary  
(Contract BMV-8/73)  
(DLR-IB-355-74/3) Avail NTIS HC \$4.00

Objective quantitative estimation of pilots' workload considering the present state of meteorology and knowledge is discussed. Pilot workload is an essential criterion for defining minimum flight crew in civil transport aviation. Best proved methods are selected, including time and motion studies, flight performance and psychological measurements, and measurement of reserve capacity. It is expected that such studies will improve human engineering and operational organization. ESA

**N76-21888#** Army Aeromedical Research Lab Fort Rucker Ala

**PERCEIVED VELOCITY AND ALTITUDE JUDGMENTS DURING ROTARY WING AIRCRAFT FLIGHT** Final Report  
Richard N Armstrong Mark A Hofman Michael G Sanders Lewis W Stone and Charles A Bowen Sep 1975 30 p refs

(DA Proj 3A7-62758-A-819)  
(AD-A016870 USAARL-76-3) Avail NTIS CSCL 05/10

Eight Army rotary wing aviators made judgments concerning the ground speed and altitude of a UH-1 helicopter. Combinations of three ground speeds and four altitudes were used across four visual conditions including daylight and simulated night environments. In general, the results indicate: (1) absolute error in ground speed estimations increased as altitude increased; (2) at ground speeds above 50 knots there was a tendency to underestimate ground speeds, and below 50 knots ground speed estimates were dependent upon visual conditions; (3) absolute error in altitude judgment increases with aircraft altitude; and (4) at low altitudes the trend is toward underestimation, and as altitude and airspeed increase the tendency is to overestimate.

altitude. These and other results are discussed as well as their possible implications for conduct of safe flight. Author (GRA)

**N76-21889#** Purdue Univ Lafayette Ind  
**THE EFFECTS OF ROOM SIZE AND GROUP SIZE ON INDIVIDUAL vs GROUP TASK PERFORMANCE**

Glenda Yukie Nogami Apr 1975 61 p refs  
(Contract N00014-67-A-0226-0030 NR Proj 177-946)  
(AD-A018028 TR-25) Avail NTIS CSCL 05/10

Four and ten person groups of males and females were placed into 70, 40, or 16 square foot rooms. Working either as a group (interacting) or individually (co-acting), they were asked to perform a perceptual task and a problem solving task. The results indicate that there is no difference in problem solving from dense to less dense areas. However, there appear to be mood and attitude differences from dense to less dense conditions and a sex difference. GRA

**N76-21890#** Naval Postgraduate School Monterey Calif  
**TIME SHARING EFFECTS ON PILOT TRACKING PERFORMANCE** M S Thesis

John Patrick Kennedy Sep 1975 47 p refs  
(AD-A016378) Avail NTIS CSCL 05/10

Subjects were required to simultaneously perform a two-dimensional tracking task and respond to a set of lights with toggle switches. Five levels of difficulty and two stimulus presentation rates were involved in the secondary task. The purpose of the experiment was to examine time-sharing performance of experienced military pilots and to investigate differences in performance by pilots of different types of aircraft. GRA

**N76-21891\*#** Environmental Research Associates Canoga Park Calif

**EVA SPACE SUIT EVAPORATIVE COOLING/HEATING GLOVE SYSTEM (ECHGS) Final Report**

F A Coss 5 Feb 1976 236 p refs  
(Contract NAS9-14479)  
(NASA-CR-147527 ERA-2 14) Avail NTIS HC \$8.00 CSCL 06K

A new astronaut glove, the Evaporative Cooling/Heating Glove System (ECHGS), was designed and developed to allow the handling of objects between -200 F and +200 F. Active heating elements positioned at each finger pad provide additional heat to the finger pads from the rest of the finger. A water evaporative cooling system provides cooling by the injection of water to the finger areas and the subsequent direct evaporation to space. Thin flexible insulation has been developed for the finger areas to limit thermal conductivity. Component and full glove tests have shown that the glove meets and exceeds the requirements to hold a 1 1/2 inch diameter bar at + or - 200 F for three minutes within comfort limits. The ECHGS is flexible, lightweight, and comfortable. Tactility is reasonable, and small objects can be identified especially by the fingertips beyond the one half width active elements. Author

**N76-21892\*#** Massachusetts Inst of Tech Cambridge Man-Vehicle Lab

**STUDIES OF HUMAN DYNAMIC SPACE ORIENTATION USING TECHNIQUES OF CONTROL THEORY** Final Report, 1964 - 1974

Laurence R Young 1974 164 p refs  
(Grant NGR-22-009 025)  
(NASA-CR-146858) Avail NTIS HC \$6.75 CSCL 05E

Studies of human orientation and manual control in high order systems are summarized. Data cover techniques for measuring and altering orientation perception, role of non-visual motion sensors, particularly the vestibular and tactile sensors, use of motion cues in closed loop control of simple, stable and unstable systems, and advanced computer controlled display systems.



**N76-21893\*** Massachusetts Inst of Tech Cambridge

# **MANUAL CONTROL**

*In its Studies of Human Dynamic Space Orientation Using Tech of Control Theory* 1974 p 3-56 refs

CSCL 05E

Man's nonlinear characteristics and his use of control with compatible and incompatible multiple inputs both visual and vestibular were studied. Experiments were also made with pulse and bang-bang controllers and the effects of sudden changes in control stick mechanical impedance. Closing the loop through the dynamics of the controlled vehicle allowed experiments on the limits of control of unstable vehicles with and without motion cues. The inverted pendulum controlled element programmed as a self-pacing element was used extensively as a scalar performance index. In addition, the motorbike equations of motion were studied with regard to required human equalization. Abstracts are included for a series of published data on manual control.

Author

**N76-21894\*** Massachusetts Inst of Tech Cambridge

# **DISPLAYS**

*In its Studies of Human Dynamic Space Orientation Using Tech of Control Theory* 1974 p 57-84 refs

CSCL 05E

An experimental investigation made to determine the depth cue of a head movement perspective and image intensity as a function of depth is summarized. The experiment was based on the use of a hybrid computer-generated contact analog visual display in which various perceptual depth cues are included on a two-dimensional CRT screen. The system's purpose was to impart information in an integrated and visually compelling fashion about the vehicle's position and orientation in space. Results show head movement gives a 40% improvement in depth discrimination when the display is between 40 and 100 cm from the subject. Intensity variation resulted in as much improvement as head movement.

Author

**N76-21895\*** Massachusetts Inst of Tech Cambridge

# **SENSORY PERCEPTION**

*In its Studies of Human Dynamic Space Orientation Using Tech of Control Theory* 1974 p 85-125 refs

CSCL 05E

The effect of motion on the ability of men to perform a variety of control actions was investigated. Special attention was given to experimental and analytical studies of the dynamic characteristics of the otoliths and semicircular canals using a two-axis angular motion simulator and a one-axis linear motion simulator.

Author

**N76-21896\*** Massachusetts Inst of Tech Cambridge

# **MEDICAL APPLICATIONS**

*In its Studies of Human Dynamic Space Orientation Using Tech of Control Theory* 1974 p 127-135 refs

CSCL 05E

The application of a hybrid computer CRT display to clinical diagnosis and treatment was investigated. Specifically, pathological limb movement and associated muscular activity was examined.

Author

**N76-21897\*** Massachusetts Inst of Tech Cambridge

# **EQUIPMENT**

*In its Studies of Human Dynamic Space Orientation Using Tech of Control Theory* 1974 p 137-145 refs

CSCL 05E

A discussion is presented on the problems encountered in designing and constructing a simulator to determine human vestibular response to a range of linear accelerations from 0 to 0.3 g's. Starting with a set of initial performance specifications, the designers combined an array of commercially available components into a system which, although requiring further

refinement before completion, shows considerable promise of fulfilling the initial requirements. The resulting system consists of a wheeled vehicle driven by a cable and drum arrangement powered by a hydraulic-electric servo-valve. Technical design considerations are presented along with a discussion of the trade-offs between various component options. A description of the system characteristics as well as an analysis of preliminary test results and recommendations for future system improvements are included.

Author

**N76-21898#** Systems Research Labs Inc Dayton Ohio

# **DESIGN OPTION DECISION TREE, A METHOD FOR SYSTEMATIC ANALYSIS OF DESIGN PROBLEMS AND INTEGRATION OF HUMAN FACTORS DATA**

W B Ackren and Kenneth D Korkan Brooks AFB Tex AFHRL Jul 1975 21 p refs. Paper presented at 18th Ann Meeting of the Human Factors Soc Huntsville Ala 15-17 Oct 1974 (Contracts F33615-70-C-1440 F33615-73-C-4044 AF Proj 1124 AF Proj 1710).

(AD-A016418 AFHRL-TR-75-9) Avail NTIS CSCL 05/5

A graphical format termed the Design Option Decision Tree (DODT) is described. The DODT displays the various design options available at each decision point in the design process. Several examples of DODTs for aircraft design problems are illustrated. The procedures for developing a DODT are described. A proposed method for use of the DODT to resolve a design problem is presented. This method includes evaluating the design options in the Tree for impact on the system and tracing paths through the Tree as dictated by specific design goals. The use of human factors data as one of the evaluation parameters is described. The paper concludes with a discussion of other uses of a DODT.

Author (GRA)

**N76-21899#** National Oceanic and Atmospheric Administration Rockville Md Manned Undersea Science and Technology Office

# **INTERNATIONAL REVIEW OF MANNED SUBMERSIBLES AND HABITATS**

Joseph R Vadus Apr 1975 88 p Presented at the Atlantic Intern Search and Rescue Seminar LANTSAR 75 NY 22-25 Apr 1975

(PB-246428/7 NOAA-75101501) Avail NTIS HC\$5.00 CSCL 13J

A tabulation is presented of the international submersibles (manned and unmanned) and habitats of the world and lists their owner/operators, location, classification and their physical characteristics and capabilities. The listings include only submersibles that are designed for operation to depths of 600 feet or greater and have been operating recently or can be made ready for sea operations within a few weeks or those under construction. The United States owns 29 out of the over 70 submersibles available worldwide. The highest incidence of submersible usage is in the North Sea.

GRA

**N76-21900#** Bolt Beranek and Newman Inc Cambridge Mass **GUIDE TO THE MANMOD2SSB (MAN-MACHINE MODEL VERSION 2 STEADY STATE BATCH VERSION), COMPUTER PROGRAM**

Jeffrey E Berliner Jun 1975 60 p refs

(Contract DAAH01-75-C-0158)

(AD-A017759 RD-CR-76-2) Avail NTIS CSCL 09/2

The MANMOD2SSB computer program allows separate specification of the internal model and the system model in the optimal control model of the human operator. This guide is the user's manual for the program.

GRA

**N76-21901#** Army Cold Regions Research and Engineering Lab Hanover NH

# **LIFE ON AN ICE ISLAND**

A Chilingarov E Sarukhanyan and M Yevseyev Dec 1975 209 p Trans into ENGLISH of the book Pod Nogami Ostrov Ledianoi Moscow 1972 160 p

(AD-A018072 CRREL-TL-502) Avail NTIS CSCL 05/5

This book was written and compiled by members of a komсомol-youth staff of scientific researchers on the drifting station Severnyy Polyus - 19 Their diaries notes log entries telegrams autobiographies interviews with veteran Arctic explorers photographs and reproductions of various documents are the content of this book On the way to the North Pole the small youthful crew of the station experienced everything that could happen to man in the Arctic including faults and cracks disintegration of the ice and hasty moves from place to place and encounters with bears However the scientific work was not interrupted for even an hour

Author (GRA)

**N76-21902#** Air Force Flight Dynamics Lab Wright-Patterson AFB Ohio

**ALL DIGITAL SIMULATION FOR MANNED FLIGHT IN TURBULENCE Final Report, Jan 1974 - Mar 1975**

Joseph J Pollard Sep 1975 189 p refs  
(AF Proj 1986)

(AD-A018126 AFFDL-TR-75-82) Avail NTIS CSCL 05/8

A completely digital simulator for manned flight in conventional aircraft through a turbulent environment is developed The six-degree-of-freedom constant coefficient linearized perturbation equations of motion are developed for use in conjunction with a generalized stability augmentation system A six-degree-of-freedom turbulence environment suggest by Mil Spec 8785B is implemented by solving stochastic linear differential equations A pilot consisting of two parts (1) a decision making data processor and (2) a physical implementation of the required control action is developed Concepts such as urgency for action instrumentation thresholds pure pilot delay pilot prediction pilot lag and pilot motor noise are treated The resulting all digital closed loop multi-axis multi-input multi-output system is applied to aircraft of various classes including the F-5 A 7 707 and T-33 Results are presented in tabular and graphical form with statistical tests run to show simulation validity and comparability with actual man-in-the-loop simulations Additional applications of the digital simulator are made showing its usefulness in the overall concept of aircraft simulation

Author (GRA)

**N76-21903#** Institute for Organizational Behaviour Research Lafayette Ind

**DEVELOPMENT AND EVALUATION OF AN OBJECTIVE TECHNIQUE TO ASSESS EFFORT IN TRAINING Final Report, Nov 1973 - Apr 1975**

Robert D Pritchard John H Hollenback and Phillip J DeLeo Oct 1975 51 p refs

(Contract F41609-74-C-0010 AF Proj 1141)

(AD-A017864 AFHRL-TR-75-39) Avail NTIS CSCL 05/9

The research explored the validation of a quantifiable objective and reliable method of measuring the amount of effort to be directly rewarded in incentive systems A battery of relevant ability tests was given to a sample of Air Force trainees and to civilian subjects using a simulation of the course taught the Air Force trainees Results showed that the simulation subjects were comparable to the Air Force subjects and that the ability test battery predicted performance equally well for both samples The hard criterion of effort displayed wide variability excellent reliability and good construct validity

GRA

**N76-21904#** Bolt Beranek and Newman Inc Cambridge Mass  
**MANMOD 1975, HUMAN INTERNAL MODELS AND SCENE PERCEPTION MODELS**

S Baron and J E Berliner Sep 1975 42 p refs

(Contract DAAH01-75-C-0158 DA Proj IM3-62303-A 214)  
(AD-A017762 RD-CR-76-3) Avail NTIS CSCL 05/8

In previous applications of the optimal control model of the human operator it has been assumed that the internal model is an exact replica of the system model This assumption appears satisfactory in many instances as has been demonstrated by agreement between model predictions and experimental data There are situations in which the assumption does not appear tenable For example highly complex systems naive or untrained operators and undetected component failure This analysis presents methods of implementing an internal model which differs from the system model

GRA

**N76-21905#** School of Aerospace Medicine Brooks AFB Tex  
**AIR-FORCE-PREPARED FROZEN MEALS EVALUATED FOR INFLIGHT SERVICE Final Report, May Oct 1974**

Joseph C Crigler John E VanDerVeen and Mary A Sanders Aug 1975 16 p refs

(AF Proj 7930)

(AD-A016425 SAM-TR-75-26) Avail NTIS CSCL 06/8

An operational test was conducted to compare the acceptability of Air-Force-prepared frozen meals with those bought on contract from a commercial source Neither type meal was superior when they were compared on the basis of appearance taste and overall acceptability Provided the Air Force meals are packaged in containers compatible to aircraft ovens these meals can be substituted without loss of quality or acceptability

Author (GRA)

**N76-21906#** Miami Univ Oxford Ohio Dept of Psychology

**RESEARCH ON THE RECOGNITION AND ANALYSIS OF COMPLEX AND DYNAMIC IMAGERY**

Allan Pantle Wright-Patterson AFB Ohio AMRL Oct 1975 63 p refs

(Contract F33615-74-C-4032 AF Proj 7233)

(AD-A018074 AMRL-TR-75-61) Avail NTIS CSCL 06/16

Recent literature on visual information processing contains considerable evidence that demonstrates the existence of functionally independent pattern (form) and transient (motion) systems in human vision Research with complex static imagery and with dynamic imagery was conducted (and is reported herein) for the purpose of elucidating the operation of the pattern and transient systems respectively Experiments on the perception of static real-life scenes were conducted within the framework of the Fourier-analyzer model a model which states that the spatial frequency components of visual scenes are encoded in separate channels Priorities for the acquisition of visual information in different spatial frequency ranges were studied in recognition experiments Complementary research on eye scans was carried out in an effort to develop procedures for correlating eye fixations with the spatial frequency content of local regions of the scenes The results suggest that relationships between recognition performance eye scans and the spatial frequency content of visual scenes can provide a useful basis for characterizing the search strategies of human observers in different kinds of perceptual tasks

GRA

**N76-21907#** Navy Experimental Diving Unit Panama City Fla  
**MODIFICATIONS AND TESTING OF MARK 10 MOD 4 CLOSED CIRCUIT BREATHING APPARATUS Final Report**

Thomas W Cetta and R Radecki Sep 1975 20 p

(AD-A017750 NEDU-6-75) Avail NTIS CSCL 06/19

As a result of extreme respiratory difficulty experienced at 1 000 ft a breathing resistance study was performed to identify the problem area A breathing resistancy of 22 centimeters of H<sub>2</sub>O inhale and 48 centimeters of H<sub>2</sub>O exhale at a depth of 1 000 FSW(feet sea water) using 0.4 PO<sub>2</sub> with a breathing rate of 37 breaths per minute was measured Upon completion of gas passage modifications the breathing resistance was reduced to 11 cm H<sub>2</sub>O exhale at a depth of 1 000 FSW using 0.4 PO<sub>2</sub> at a breathing rate of 37 breaths per minute As a culmination of the tests and modifications during NAVXDIVINGU's 1 600 ft working dive breathing resistance was measured on a diver using a Mark 10 Mod 4 as modified to be 12 cm inhale and 15 cm exhale at a breathing rate of 23 breaths per minute

GRA

**N76-21908#** Air Force Human Resources Lab Brooks AFB Tex

**UNDERGRADUATE PILOT TRAINING TASK MANEUVER TIME STUDY Final Report, Jul 1973 - Sep 1974**

James E Brown J T Mullen and Steven K Rust Sep 1975 23 p refs

(AF Proj 1123)

(AD A017844 AFHRL-TR-75-42) Avail NTIS CSCL 05/9

The objective of this study was to determine the time required to perform selected undergraduate pilot training maneuvers in the T-37 and T-38 aircraft This report describes the method of

collecting data and the maneuvers selected for investigation. The data for each maneuver was analyzed to provide maximum and minimum values, means and standard deviations. Implications of the data for syllabus development are presented. GRA

**N76-21909#** Air Force Human Resources Lab Brooks AFB Tex

**ENVIRONMENTAL DATA BASE DEVELOPMENT PROCESS FOR THE ASUPT CIG SYSTEM Final Report**

Eric G Monroe Aug 1975 67 p  
(AF Proj 1192)

(AD-A017845 AFHRL-TR-75-24) Avail NTIS CSCL 05/9

This report was prepared under the assumption that the reader has a general understanding of the Advanced Simulator for Undergraduate Pilot Training (ASUPT) Computer Image Generation (CIG) System at least to the level of that presented in the technical report Advanced Simulation in Undergraduate Pilot Training (ASUPT) Facility Utilization Plan. Modeling for CIG may be thought of as a new art form in which the features to be modeled are approximated by sets of straight line segments forming planar faces to which a shade of gray is assigned. Basically the data base is structured in the sequence edge face object model and environment, each item composed of a set of the items immediately preceding it in the sequence. The detailed definition of each item is transferred from the coding forms prepared by the modeler to computer input cards. These cards serve as the computer source input. The offline software algorithms perform validation checks on this input. Error messages are related through the teletype and line printer. Valid data is stored as libraries of objects, models and environments on magnetic tapes, and the appropriate environment is restored on disc by a media conversion from tape to disc. GRA

**N76-21910#** Environmental Health Lab Kelly AFB Tex  
**EVALUATION OF POTABILITY OF WATER COLLECTED/STORED IN SEA SURVIVAL EQUIPMENT Final Report**

Richard A Virost Mar 1975 31 p refs

(AD-A008188 EHL(K)-75-4) Avail NTIS CSCL 06/20

Results of three investigations into the potability of water collected/stored in sea survival equipment are reported. Items tested included a rubberbacked nylon life raft canopy, a vinyl-coated nylon signal paulin, and a chloroprene-coated nylon life preserver flotation cell. The effects on potability of all three items were investigated based first on the techniques used to manufacture the item, second on the storage and use of the item, and third on a chemical/public health analysis of water that had been in contact with the item for 72 hours. The studies revealed that the canopy did not deleteriously affect the water collected/stored on it. The other studies indicated that both the paulin and the flotation cell would require pretreatment to remove either physically or physiologically objectionable material. Suggestions for pretreatment are included that could be implemented either in the survival situation or preferably before use. GRA

**N76-21911#** Payne Inc Annapolis Md  
**SELECTED TOPICS ON TRACTOR ESCAPE SYSTEMS Final Report, 1 Nov 1973 - 31 Jan 1975**

Peter R Payne Jul 1975 146 p refs

(Contract F33615-74-C-4015 AF Proj 7231)

(AD-A018073 Working-Paper-119-10 AMRL-TR-75-9) Avail NTIS CSCL 01/3

In assessing the effectiveness of an extraction escape system, the motion of the crew member as he clears the cockpit is generally more important than his subsequent trajectory, particularly if we are concerned about the possibility of injury due to impact with the local structure or injury due to limb flailing. The aerodynamic forces (and resulting deformation) of the extraction pendant, and the aerodynamic forces on the crew member as he emerges from the cockpit, are the most important items, and these are analyzed theoretically in this report. Emerging crew member forces are also measured experimentally using live human subjects in a wind tunnel simulation of extraction from an aircraft. A new extraction system concept - the ballistic extractor - is also analyzed in a preliminary way and is found

to offer promise of avoiding the high speed ejection problems of rocket extraction systems. It should also be lighter, less expensive to develop and less expensive to build in quantity.

Author (GRA)

**N76-21912#** Research Triangle Inst Research Triangle Park NC

**RANN UTILIZATION EXPERIENCE CASE STUDY NO 6 INDUSTRIAL SWEETENER SYRUPS**

G T Isao 1975 30 p refs Prepared by Iowa State Univ of Sci and Technol

(Contract NSF C-927)

(PB-247250/4 NSF/RA/G-75-034) Avail NTIS HC \$4.00

Available also as complete report and summary, PB-247243 HC \$13.00 CSCL 07A

The development of techniques for applying immobilized enzyme reactions as an improved method for the production of industrial sweetener syrups from cornstarch is discussed. GRA

**N76-21913#** National Aeronautics and Space Administration Ames Research Center Moffett Field Calif

**STUDIES RELATED TO THE DEVELOPMENT OF THE VIKING 1975 LABELED RELEASE EXPERIMENT**

Donald L DeVincenzi and Paul H Deal Washington Apr 1976 19 p refs

(NASA-TR-R-460 A-6408) Avail NTIS HC \$3.50 CSCL 03B

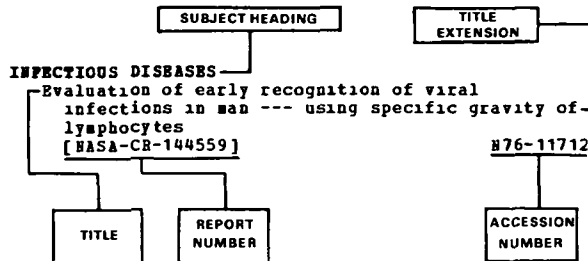
The labeled release life detection experiment on the Viking 1975 Mars mission is based on the concept that microorganisms will metabolize radioactive organic substrates in a nutrient medium and release radioactive carbon dioxide. Several experiments using laboratory equipment were carried out to evaluate various aspects of the concept. Results indicate (1) label is released by sterilization-treated soil, (2) substantial quantities of label are retained in solution under basic conditions, (3) the substrate used as well as position of label in the molecule affect release of label, (4) label release is depressed by radiolytic decomposition of substrates, and (5) About 100,000 organisms are required to produce a detectable response. These results suggest additional areas for testing add to the data base for interpretation of flight results and have significance for broader application of this technique for assessing microbial activity. Author

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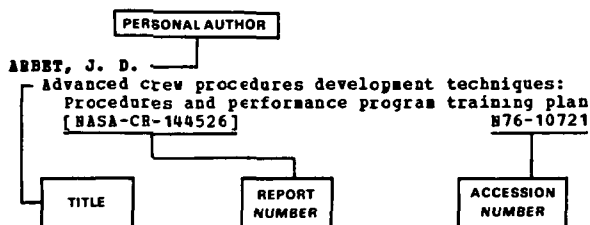
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